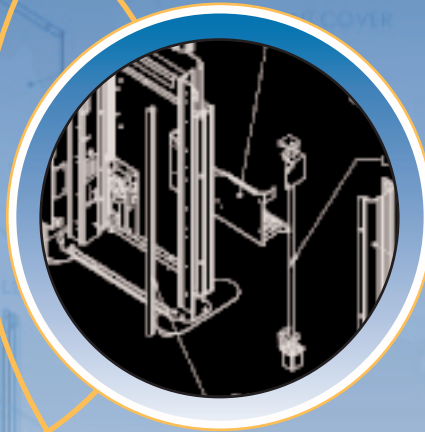
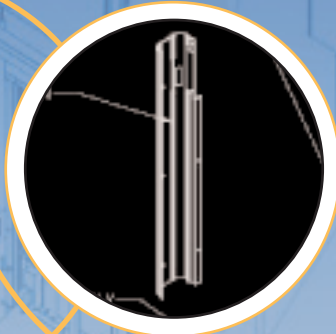
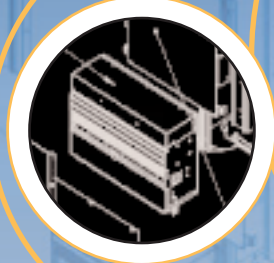


VERTX

SERVICE MANUAL



Digital Imaging Made Simple.™

Foreword

Proprietary Notice and Disclaimer

The information herein disclosed is the property of iCRco., Inc. Information in this document is subject to change without notice and does not represent a commitment by iCRco to incorporate changes or improvements in units previously sold or shipped.

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Terms

Any one of the following iCR products will be referred to as the "CR unit" throughout this document: iCR 1000®, iCR 1000 Dual®, iCR 2600®, iCR 2600 Dual®, iCR 2600SF®, iCR 3600®, iCR Vet®, iCR Vet Dual®, iCR Mobile®, iCR 1-D®, iCR Chiro®, iCR Chiro Dual®, iCR VERTX® Any one of the following iCR products will be referred to as "iCR dual unit" throughout this document: iCR 1000 Dual®, iCR 2600 Dual®, iCR Vet Dual®, iCR Chiro Dual® Any one of the following iCR products will be referred to as "iCR desktop unit" throughout this document: iCR VERTX®. The iDR® will be referred to as the "DR unit" throughout this document.

Contact Information

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Web: <http://www.icrcompany.com>

VertX Information

Please Enter the details of the VertX system here:

Serial Number: _____

Date Purchased: _____

Interface Type: USB 2.0

Safety Information

Read and understand the installation and operating instructions before applying power to the VertX.



Conventions

⚠ DANGER A DANGER indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury. This signal word is to be limited to the most extreme situations.

⚠ WARNING A WARNING indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

⚠ CAUTION A CAUTION indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices.

Note A NOTE indicates important information that helps you make better use of your VertX and Software.

Notice A NOTICE indicates either potential damage to hardware or loss of data and tells you how to avoid the problem.


Laser Safety


⚠ CAUTION This equipment employs a laser. Laser radiation may be present if the VertX is operated without the covers. Avoid the laser beam. Direct exposure to laser light must be avoided.

The VertX incorporates a Red $\geq 80\text{mw}$ high-power solid-state laser diode. The VertX covers

protect the service person from direct exposure to laser light. These covers will protect a user/service person only if they are properly installed. Covers must be removed and replaced by properly trained service personnel. Contact iCRco if there are any issues with the covers being damaged or replacement covers are needed.

Electrical Hazards

 **WARNING** This equipment is operated with hazardous voltages which can shock, burn, or cause death.

 **Notice** The VertX must be connected to a uninterruptible power supply (UPS). Failure to use a (UPS) will void the warranty.

The equipment must be serviced by properly trained technicians certified by iCRco, Inc. Do not connect the VertX with a damaged or sub-standard power cable. Do not use an extension cord with this device. The VertX should be properly grounded and power connections inspected to ensure safe operation. Use at least a 1300VA (780W) uninterruptible power supply (UPS) with this device, as it is sensitive to variations in power.

Malfunctioning Equipment

If any iCRco product shows signs of malfunction, discontinue the use of the product immediately and contact Technical Support at 310-921-9559.

FCC Notification

This equipment generates, uses, and can radiate radio frequency energy, and if not installed properly, can cause interference with radio communications.

Mammography Use

The VertX is not intended for Mammography use.

Guidance and Manufacture's declaration – Electromagnetic Emissions & Immunity

Table 1: Electromagnetic Emissions

Guidance and manufactures' declaration – electromagnetic emissions		
The VertX is intended for use in the electromagnetic environment specified below. The customer or the user of the VertX should assure that it is used in such an environment.		
Emissions test	Compliance	Electromagnetic environment – guidance
RF emissions CISPR 11	Group 1	The VertX uses RF energy only for its internal function. Therefore, its RF emissions are very low and are not likely to cause any interference in nearby electronic equipment. The VertX is suitable for use in all establishments, including domestic and those directly to the public low voltage power supply network that supplies buildings used for domestic purposes.
RF emissions CISPR 11	Class B	
Harmonic emissions IEC 61000-3-2	Class B	
Voltage fluctuations/flicker emissions IEC 61000-3-3	Complies	

Table 2: Electromagnetic Immunity


Immunity Test	IEC 60601 Test Level	Compliance Level	Electromagnetic Environment – Guidance
Electrostatic discharge (ESD) IEC 61000-4-2	±(2, 4, 6) kV Contact	±(2, 4, 6) kV Contact	Floors should be wood, concrete or ceramic tile. If floors are covered with synthetic material, the relative humidity should be at least 30%.
	±(2, 4, 8) kV air	±(2, 4, 8) kV air	
Electrical fast transient/burst IEC 61000-4-4	±2 kV for power supply lines	±2 kV for power supply lines	Mains power quality should be that of a typical commercial or hospital environment.
	±1kV for input/output lines	±1kV for input/output lines	

continued on next page...

<i>Table 2 continued...</i>			
Immunity Test	IEC 60601 Test Level	Compliance Level	Electromagnetic Environment – Guidance
Surge IEC 61000-4-5	±1 kV differential mode ±2 kV common mode	±1 kV differential mode ±2 kV common mode	Mains power quality should be that of a typical commercial or hospital environment.
Voltage dips, short interruptions and voltage variations on power supply input lines IEC 61000-4-11	<5% U_T (>95% dip in U_T) for 0.5 cycle. 40% U_T (60% dip in U_T) for 5 cycles. 70% U_T (30% dip in U_T) for 25 cycles. <5% U_T (>95% dip in U_T) for 5 sec.	<5% U_T (>95% dip in U_T) for 0.5 cycle. 40% U_T (60% dip in U_T) for 5 cycles. 70% U_T (30% dip in U_T) for 25 cycles. <5% U_T (>95% dip in U_T) for 5 sec.	Mains power quality should be that of a typical commercial or hospital environment. If the user of the VertX requires continued operation during power mains interruptions, it is recommended that the VertX be powered from an uninterruptible power supply or a battery.
Power frequency (50/60Hz) magnetic field IEC 61000-4-8	3A/m	3A/m	Power frequency magnetic fields should be at levels characteristic of a typical location in a typical commercial or hospital environment.
NOTE: U_T is the a.c. mains voltage prior to application of the test level.			

continued on next page...

Table 2 continued...

Immunity Test	IEC 60601 Test Level	Compliance Level	Electromagnetic Environment – Guidance
Conducted RF IEC 61000-4-6	3Vrms 150 kHz to 80 MHz	3Vrms	Portable and mobile RF communications equipment should be used no closer to any part of the VertX, including cables, than the recommended separation distance calculated from the equation applicable to the frequency of the transmitter. Recommended separations distance $d = 1.2\sqrt{P}$ $d = 1.2\sqrt{P}$ 80 MHz to 800 MHz $d = 2.3\sqrt{P}$ 800 MHz to 2.5 GHz where P is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer and d is the recommended separation distance in meters (m). Field strengths from fixed RF transmitters as determined by an electromagnetic site survey ^a , should be less than the compliance level in each frequency range ^b . Interference may occur in the vicinity of equipment marked with the following symbol: 
Radiated RF IEC 61000-4-3	3 V/m 80 MHz to 2.5 GHz	3 V/m	

NOTE 1: At 80 MHz and 800 MHz, the higher frequency range applies.

NOTE 2: These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflections from structures, objects and people.

continued on next page...

Table 2 continued...

Immunity Test	IEC 60601 Test Level	Compliance Level	Electromagnetic Environment – Guidance
^a Field strengths from fixed transmitters, such as base stations for radio (cellular/cordless) telephones and land mobile radios, amateur radio, AM and FM radio broadcast and TV broadcast cannot be predicted theoretically with accuracy. To assess the electromagnetic environment due to fixed RF transmitters, an electromagnetic site survey should be considered. If the measured field strength in the location where the VertX is used exceeds the applicable RF compliance levels above, the VertX should be observed to verify normal operation. If abnormal performance is observed, additional measures may be necessary, such as reorienting or relocating the VertX.			
^b Over the frequency range 150 kHz to 80 MHz, field strengths should be less than 3 V/m.			

iCRco Warranty

iCRco, Inc. (“iCRco”) values your business and always strives to provide high quality products and services. All iCRco products are provided with an initial warranty so the hardware and software are covered from the date of purchase. This limited warranty solely applies to new products manufactured by or for iCRco and originally purchased from iCRco or an authorized dealer of iCRco products for your own use. In addition, an extended warranty is available for most new and recently purchased iCRco products for an additional charge.

Hardware Limited Warranty

iCRco warrants its hardware products to be free of defects in materials and workmanship for a period of one (1) year from the date of original shipment from iCRco subject to the limitations set forth herein. If a product proves to be defective in material or workmanship during the warranty period, iCRco will, at its sole option, repair or replace the product with a similar product. Repaired and replacement products may be or include refurbished or remanufactured parts. Any replacement item assumes the remaining warranty period of the original product. iCRco provides no warranty for any third party hardware or software included with any product or later acquired.

Software Limited Warranty/Support

iCRco warrants that its QPC XSCAN32, Captera, and/or ClarityPACS software originally provided with any product will substantially conform to iCRco’s specifications and that the media, not including hard drives, on which the software is furnished will be free from

defects in materials and workmanship under normal use for a period of one (1) year from the date of original shipment from iCRco. iCRco's sole obligation under this warranty is limited to making reasonable efforts to ensure such conformity and to supply the consumer with a corrected version of the software as soon as it is practical after the consumer has notified iCRco of any non conformity. iCRco does not warrant that the operation of any software will be uninterrupted, glitch or error free or that functions contained in the software will operate in the combinations which may be selected for use by the user or meet the user's requirements. This limited software warranty will be void if the software is modified without the written approval of iCRco or is used outside of the recommended parameters or equipment. iCRco does not provide any warranty or support for any other software.

iCRco agrees to provide one (1) year of telephonic and/or e-mail based support for QPC XSCAN32, Captera, and/or ClarityPACS software originally provided with any new iCRco product from the date of original shipment from iCRco. All software support shall be limited to making reasonable efforts to resolve iCRco software issues and shall be limited to iCRco's regular business hours. In addition, iCRco will provide revisions and upgrades to its software upon request (when available) during the first year after the software was originally shipped from the iCRco factory. The initial support period will include support via remote login software (GoToMeeting), only if the customer has access to the Internet from that PC and only if the customer agrees iCRco shall have no liability in connection with its support efforts. Remote login software allows iCRco technical support to remotely access the customer's PC via the Internet for the purposes of rendering technical support. Please note that this warranty, including software support, does not include computer hardware, third party software or operating system or network issues, which are outside the control of iCRco.

Warranty Product Technical Requirements

iCRco requires that all DR, CR, Scanner and/or products requiring PCs be fitted and installed with a 1500VA (1500W) uninterruptible power supply ("UPS"). iCRco recommends the APC 1000 specification UPS or equivalent. For warranty evaluation and service, iCRco requires the customer to provide an Internet connection (DSL or Dial-up) or the minimum of a phone line accessible by an extension cord to the product enabling iCRco technicians to perform remote diagnostics on installed equipment. In addition, each iCRco product must be installed, maintained and operated in accordance with the respective product manual. Failure to comply with these requirements will result in a voided warranty claim.

Requesting Warranty Service

For information on obtaining warranty service, call iCRco's customer support at (310)921-9559. In order to evaluate a warranty service request, iCRco requires the following information: the iCRco serial number of the product, a detailed description of the problem, customer name and contact information; product location and operating conditions; a copy

of the purchase documents, and sufficient information and authorization, including a liability release as to any loss of data (that should always be backed up), software or network injury, or downtime, allowing iCRco technicians remote access to the product. Product may not be returned to iCRco without first obtaining a Return Material Authorization (“RMA”) number from iCRco. Prior to providing an RMA, iCRco may require remote access to the product. If iCRco determines that the product may be defective, is under warranty and necessitates a return to iCRco for service, an RMA number and instructions for return of the product will be given. iCRco is not responsible for any unauthorized returned product, i.e. one for which an RMA number has not been issued by iCRco.

Warranty service requires all authorized returns be shipped to the iCRco factory prepaid and insured. All such authorized returns are the customer’s responsibility. For products sold and located within the United States, iCRco will pay for return shipping.

Products being returned are only to be shipped in iCRco approved shipping containers. The original box and packaging materials are approved and should be kept for moving and/or shipping the product. Approved packaging may also be purchased from iCRco for an additional charge. iCRco shall have no liability nor responsibility for warranty service to any product that is not shipped in an iCRco approved shipping container or that is damaged from incorrect packaging or damaged during shipping.

Additional Warranty Limitations and Extent of Warranty

This warranty does not apply if the product has been damaged by accident, misuse or abuse. In addition, warranty service does not include the repair of failures or defects caused by: unauthorized attachments to any iCRco product, unsuitable physical or operating environment, maintenance or repair by anyone other than iCRco or the iCRco authorized dealer that sold the product, operation of a product beyond its duty cycle, use of the product outside of its specifications, the use of supplies, parts, materials, software, or interfaces not furnished, authorized or recommended by iCRco. If the product, including any software has been opened, tampered with, modified or altered in any way without written authorization by iCRco, the warranty will no longer apply.

This warranty applies only to products manufactured by, or for, iCRco, and that can be identified by an “iCRco” serial number as originally affixed to the product. Any modification to the iCRco serial number tag or its attachment to the product shall immediately void the warranty.

This warranty is non-transferable and subsequent owners must contact iCRco to establish if the equipment is eligible for an extended warranty.

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ARE LIMITED IN DURATION TO THE INITIAL WARRANTY PERIOD AND NO WARRANTIES, EXPRESS OR IMPLIED, WILL APPLY AFTER THIS PERIOD. ALL INFORMATION, SPECIFICATIONS, PRICES, AND SERVICES ARE SUBJECT TO CHANGE AT ANY TIME WITHOUT NOTICE.

Limitation of Remedies and Liability/Exclusion of Damages

The exclusive remedy for any defective product is limited to the repair or replacement of the defective product. iCRco shall have a reasonable time after determining that a defective product exists to repair or replace a defective product. iCRco's entire liability for any product is limited to the actual purchase price for the product. This limitation applies even if iCRco cannot or does not repair or replace any defective product.

IN NO EVENT WILL iCRco BE LIABLE FOR ANY GENERAL, SPECIAL, CONSEQUENTIAL OR INCIDENTAL DAMAGES, including but not limited to, damages related to the loss of use, loss of recorded product, the installation of replacement product, or any inspection, testing, or redesign caused by any defect or by the repair or replacement of any product arising from a defect in any product. This exclusion of damages applies even if the customer advises iCRco or an iCRco dealer of the possibility of such damages. *This limitation of remedies also applies to claims against any suppliers or dealers of iCRco. iCRco and its suppliers' and dealers' limitations of remedies are not cumulative. Such suppliers and dealers are intended beneficiaries of this limitation. iCRco is not liable for any claim by or against the customer arising from a third party claim.*

Revision History

Revision	Author	Date	Notes
A	MS	2009-02-06	Initial Release
B	MS	2010-01-08	Updated layout
C	MS	2010-03-22	Updated safety information

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1. Introduction

1.1 Overview

The VertX unit is an ultra high resolution Computed Radiography (CR) device. It is designed to scan cassettes containing phosphor screens (CR plates) using patented technology. CR plates are transported past a scanning head without bending or using rollers. This True Flat Scan Path© results in ultra high resolution images with high fidelity across the entire image. High resolution is achieved from the CR plates by coupling the True Flat Scan Path© with a high energy laser.

The VertX unit collects 16 bits (65,536 possible gray levels) data that is converted to a DICOM 3.0 image and can be stored, viewed, manipulated, and sent to any other storage device, printer, or viewing station through the medical transfer protocol specified by DICOM. This document contains a basic technical overview of the VertX unit and driving software subsystems. A general description of the systems functionality and user interfaces will be described. Unpacking of the hardware and software installation. This document is intended for users who need to understand the basic principles of operation for the VertX unit.

2. Pre-Installation

2.1 Voltage Requirements

The VERTX unit incorporates an international auto-switching power supply. iCRco employs CE certified medical grade universal power supplies to allow the unit to work between 90 to 253V AC 50/60Hz. In order to run the unit with different power types, apply voltage to the power input module at the end of the VERTX unit. For international units, a local power cord must be used that can handle the power requirements of the unit. A 13A/220V power cord is sufficient.

2.2 Environmental

The VERTX unit should not be placed in a room with a film processor present. This will void the warranty. The humidity and temperature limits are 20 to 95% non-condensing, and 59°F to 95°F (15°C to 35°C), operating, respectively.

Installation of the VertX near high magnetic fields may cause the VertX to malfunction. The VertX should not be placed in a room with an MRI, CT, or any other equipment that produces high magnetic fields.

The room should have good ventilation. Another factor to consider prior to installing the VertX is dust and particulates in the environment. The VertX is designed to be resistant to dust and particulates that may be present at the installation site.

2.3 Systems Specifications

Cassette Sizes

14x17in, 10x12in (the VERTX uses iCRco digital X-ray cassettes that comply with all standards for conventional X-ray cassettes).

Scan Rate

Scan Rate 60 lines/second

Grey Scale Resolution

16 bits (65,536 shades of gray)

Pixels per Line Resolution

3500 (High Resolution) over 14 inches (356mm) 2048 (Normal Resolution) over 14 inches (356mm).

Interface

USB 2.0

Dimensions

iCR VERTX: 34.9H x 20W x 6.7D inches

Vibration/Acceleration

3-4G Max (in shipping)

Power Requirements

Domestic: 100 to 120V, 50/60Hz, 3.5A
International: 220 to 240V, 50/60Hz, 1.75A

Altitude

0 to 9,500 ft. - operating

Temperature Conditions

59°F to 95°F (15°C to 35°C) – operating
0°F to 150°F (-18°C to 65°C) – non-operating

Weight

59 lbs (without accessories)

Humidity

20 to 95% non-condensing

Warm Up Time

Five (5) minutes.

2.4 Physical requirements


The VERTX unit requires a stable operating environment. It is important the system is placed where it will not be susceptible to tipping over or falling. Please ensure that the base plate is properly installed. Optionally, the VERTX unit can be mounted to the wall or to a mobile cart.

2.5 Connectivity and power supply

The room needs to have wall power and **should not be used with an extension cord**. The room needs to have wall power and should not be used with an extension cord. Use at least a 1500VA (780W) UPS between the wall power and the VertX. It is also required to have a network connection for fast technical support. Alternatively, the user must have a phone/fax line that can be connected to the PC as a minimum to comply with iCRco warranty terms.

3. Packing List

3.1 Packing List

 **WARNING** The UPS *CAN NOT* ship with the battery connected. Upon unpacking the VERTX and its accessories, the UPS will need to have the battery reconnected.

Box 1: Scanning

1. (1) VERTX Scanner with AC cord attached
2. (1) USB 2.0 cable
3. (1) Suspension Mounting Kit

Box 2: Accessories A

1. (4) 14 x 17" Cassette
2. (4) 10 x 12" Cassette
3. (1) 14 x 17" Grid Cap
4. (1) 10 x 12" Grid Cap
5. (2) Panasonic Toughbook CF-52 Laptops and (2) AC adapters
6. (1) EZCR din Test Tool

Box 3: Accessories B

1. (1) APC 1300 UPS
2. (1) 19" FIME 2MP Monitor & (1) USB cable & (1) Power Cord
3. (1) Network Switch & (1) Network Switch Power Supply
4. (1) 100ft CAT-5 Cable
5. (1) 15ft CAT-5 cable
6. (1) External Hard Drive & (1) AC Adapter and (1) USB Cable
7. (4) 100 CD spindles and (4) CD Envelopes

4. Unpacking / Setup Instructions

4.1 Unpacking & Setup Instructions

1. Remove the Uninterruptable Power Supply (UPS) from the box.
2. Make sure to connect the red wire to the battery terminal (remove the bottom panel from the UPS and plug the red wire into the battery terminal).
3. Plug the UPS into a stable, standard 120 AC power outlet.
4. Remove the VERTX from the box.
5. Plug the VERTX into the UPS battery backup (the bottom set of outlets on the UPS).
6. Remove the Acquisition Toughbook (the one with two strips of Velcro on the bottom) and AC adapter from the box.
7. Plug one end of the AC adapter into the Toughbook and the other end into UPS surge protector outlet (the Toughbook has its own battery backup).
8. Connect one end of the USB cable into the VERTX USB plug and the other end into the Acquisition Toughbook USB port.
9. Remove the Viewing Toughbook and AC adapter from the box.
10. Plug one end of the AC adapter into the Toughbook and the other end into UPS surge protector outlet.
11. Remove the external hi-resolution display and AC adapter from the box.
12. Plug the AC adapter into a standard AC power outlet.
13. Plug the USB cable into a USB port on the Viewing Toughbook.
14. Remove the network switch, AC adapter and two Ethernet cables from the box.
15. Plug one end of the AC adapter into a standard AC power outlet and the other end into the network switch.
16. Plug the 100 foot Ethernet cable into the Ethernet port on the back of the Acquisition Toughbook, then plug the other end of the Ethernet cable into port 1 of the network switch.
17. Plug the 15 foot Ethernet cable into the Ethernet port on the back of the Viewing Toughbook, then plug the other end of the Ethernet cable into port 2 of the network switch.
18. Turn ON the UPS, both Toughbooks, the external hi-resolution monitor, and the VERTX unit (there is no switch for network switch).
19. Verify everything is ON and working.

5. Driver and Software Installation

5.1 Driver and Software Installation

The computer hardware necessary to interface with the VERTX is shipped to the customer with all needed drivers and software installed. If the need arises, the following section describes how to install the software.

The “standard” military deployment consists of the following software components: **Drivers:** iCR VERTX (installed when QPC XSCAN is installed), Ampronix external USB display, external hard drive DiskGo HD. **Software:** QPC XSCAN.

5.2 Installing USB drivers

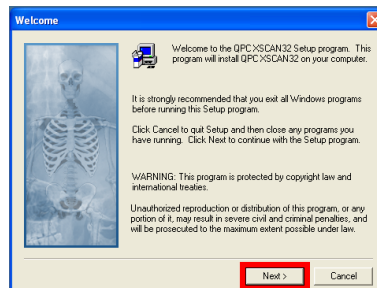
USB drivers are automatically installed while installing QPC XSCAN32.

5.3 Installing QPC XSCAN32

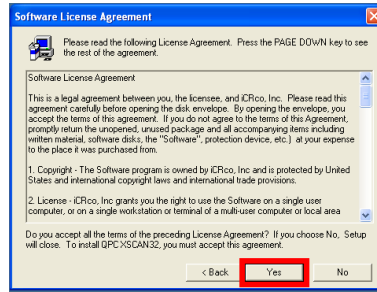
QPC XSCAN32 software comes bundled with the VERTX unit. This software package will allow the user to interface with the VERTX unit.

Note If you have QPC XSCAN32 already installed on your computer and it is running while you are trying to install the new version, an error will appear in the install process. Please close QPC XSCAN32 and reinstall the new version.

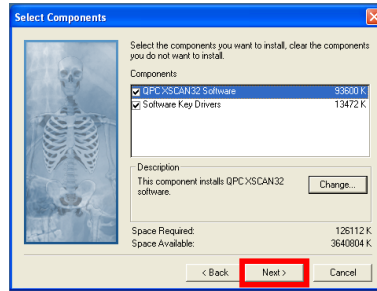
1. Insert the media containing the QPC XSCAN32 installer into the computer. Navigate to the *QPC XSCAN32* folder.
2. Launch the QPC XSCAN32 installer by double clicking **Setup.exe**.
3. Click **Next** at the welcome screen.



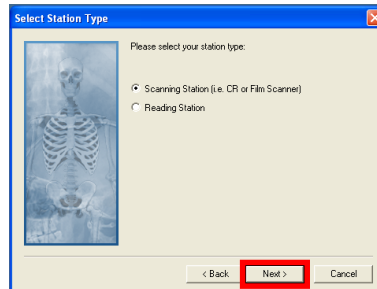
4. Click **Yes** to agree to the Software License Agreement.



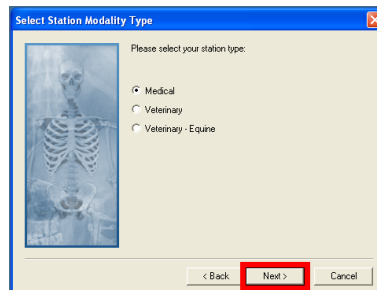
5. Make sure both *QPC XSCAN32 Software* and *Software Key Driver* boxes are checked, then click **Next**.



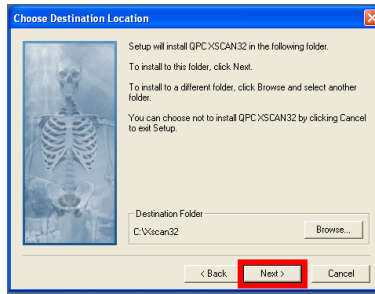
6. Select *Scanning Station* or *Reading Station* depend on the use, then click **Next** to continue.



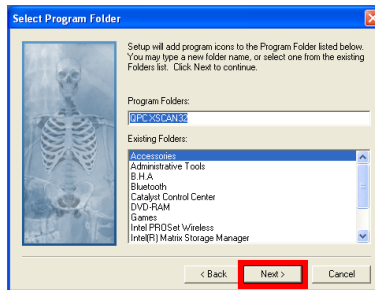
7. Select the appropriate modality, then click **Next** to continue.



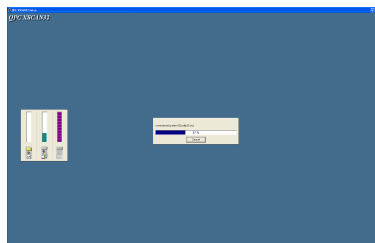
8. The Destination Folder should be set to *C : \Xscan32* then click **Next** to continue.



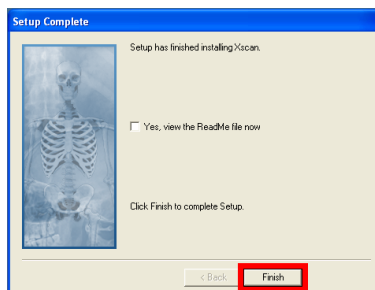
9. The Program Folder name should be set to *QPC XSCAN32*, then click **Next**.



10. QPC XSCAN32 will begin to install. Be patient while XSCAN32 installs.



11. Click **Finish** to complete the installation of QPC XSCAN32. The installer will exit.



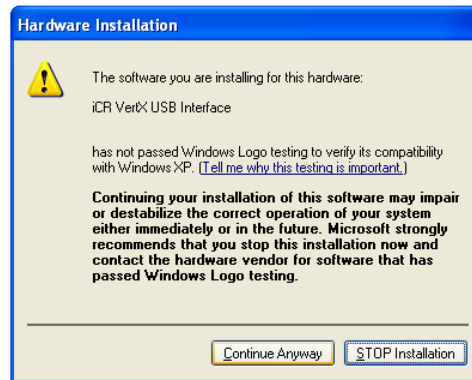
5.4 Initializing the VERTX Driver

Note This process will need to be repeated for each USB port on the laptop. There are 4 USB ports on each laptop.

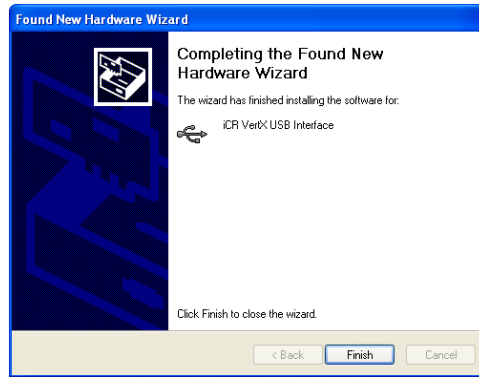
1. Make sure the VERTX unit is powered on and has the proper USB cable installed.
2. Plug the USB cable into the laptop.
3. The New Hardware Wizard dialog will pop up. Select the option *Install the software automatically*, then click **Next**.



4. A driver signing warning will appear. Click **Continue Anyway**.



5. The installation process is finished. Click **Finish** to finish the installation.



5.5 Installing Ampronix External Monitor Drivers

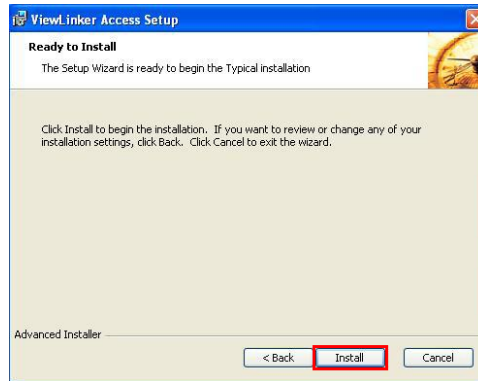
1. Insert the installation media into the computer.
2. Double click the **Setup.exe** file.
3. The Welcome screen will appear. Click **Next**.



4. At the license agreement screen, select the radio dialog box next to *I accept the terms in the License Agreement*, then click **Next**.



5. Click **Install** to begin the installation.



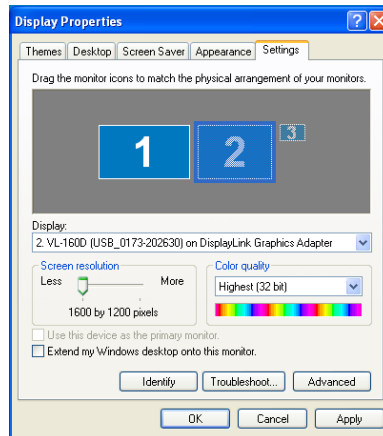
6. Click **Finish** to complete the installation.



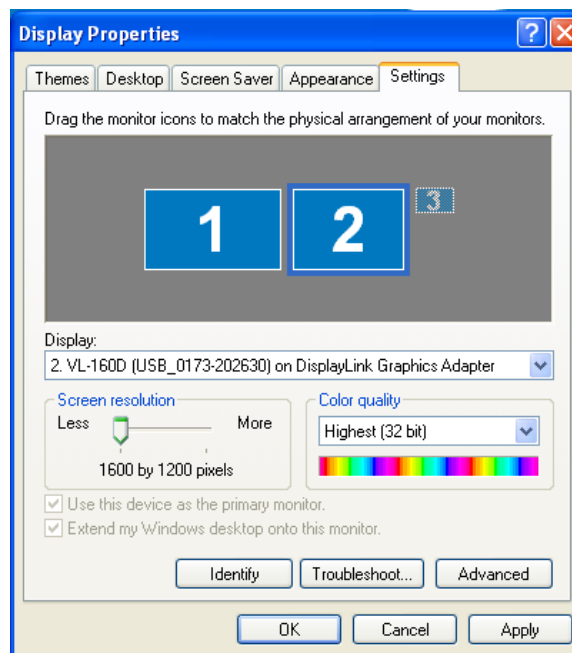
7. The user may need to reboot the computer for the installation to be completed.

5.6 Monitor Configuration

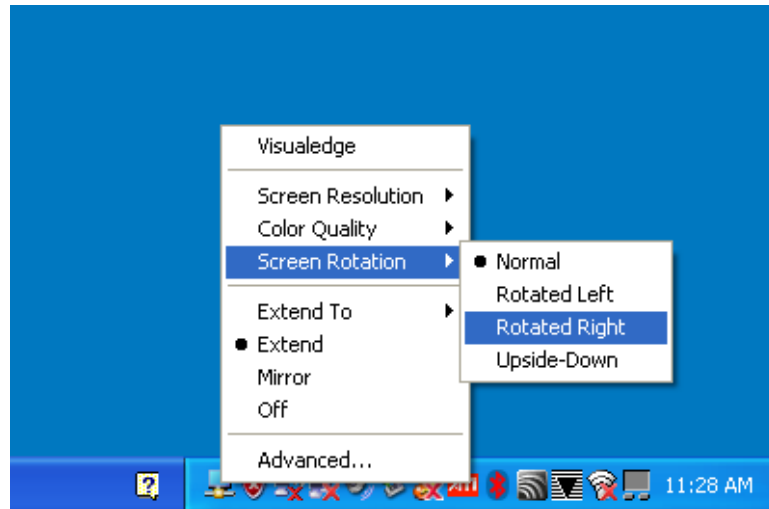
1. Ensure that the external monitor is powered on and is connected to the laptop via the USB cable.
2. Go to *Start → Control Panel → Display*.
3. In the *Display Properties*, click on the **Settings** tab.
4. In the Settings tab, select the display *VL-160D* – this is the external monitor.



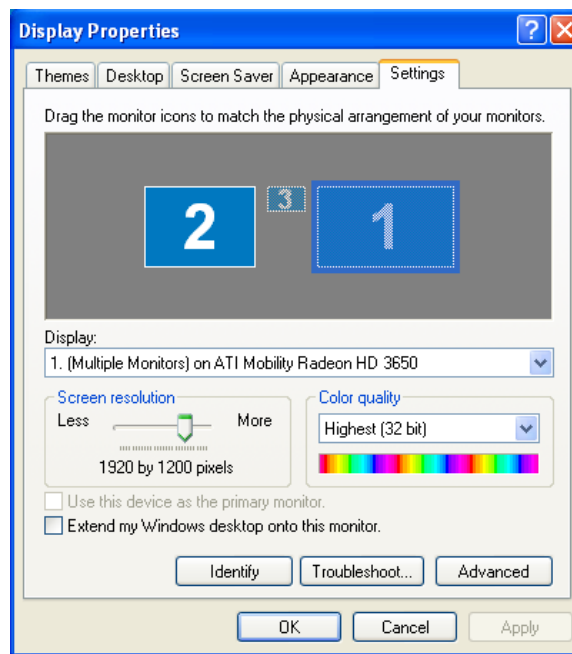
5. Check the box, *Extend my Windows desktop onto this monitor*.
6. Check the box *Use this device as the primary monitor*.



7. Click *Apply*.
8. To rotate the external monitor to portrait mode, right click on the monitor icon in the system tray, then select *Screen Rotation*, then click *Rotate Right*.



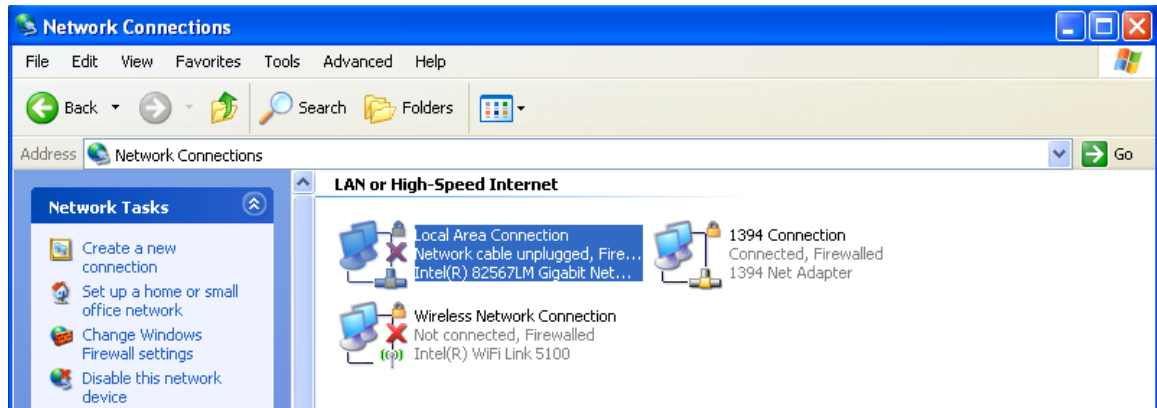
9. Select Monitor 1, then uncheck *Extend my Windows desktop onto this monitor*.



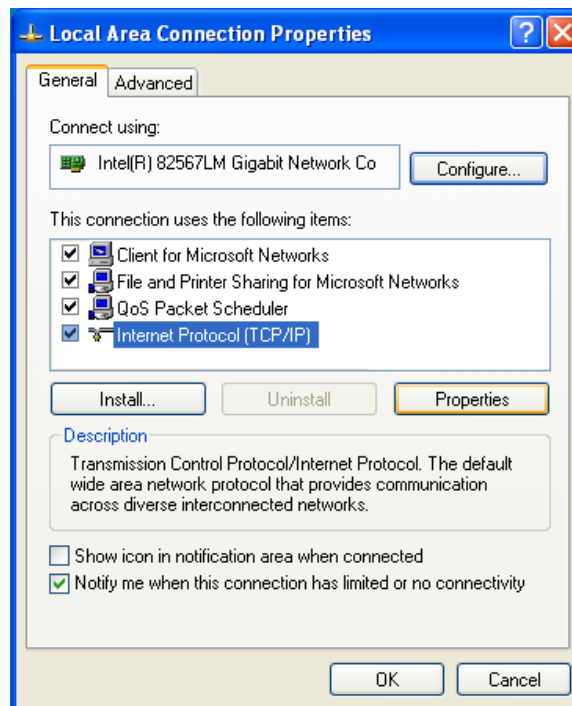
10. Click Apply.
11. This will turn off the laptop monitor, leaving the external monitor as the main, functioning screen.

5.7 Network Configuration

1. Go to *Start* → *Control Panel* → *Network Connections*, then double click **Local Area Connection**.



2. Select *Internet Protocol (TCP/IP)*, then click **Properties**.



3. Select the check box *Use the following IP address*.

4. If the laptop is an Acquisition station, enter the following:

IP Address: 192.168.0.1

Subnet Mask: 255.255.255.0

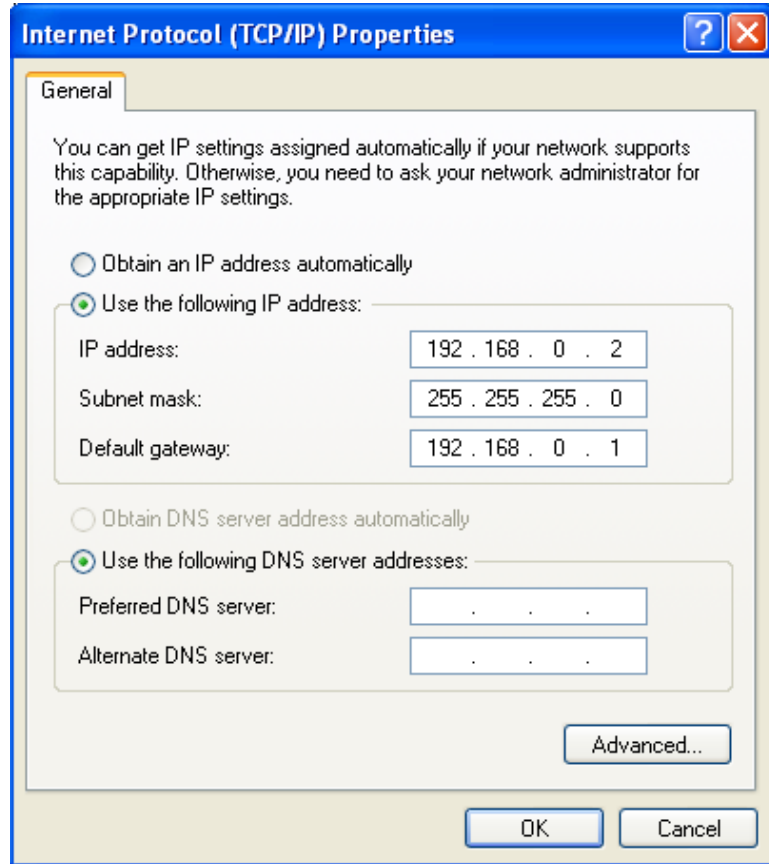
Default Gateway: 192.168.0.1

If the laptop is a Viewing station, enter the following:

IP Address: 192.168.0.2

Subnet Mask: 255.255.255.0

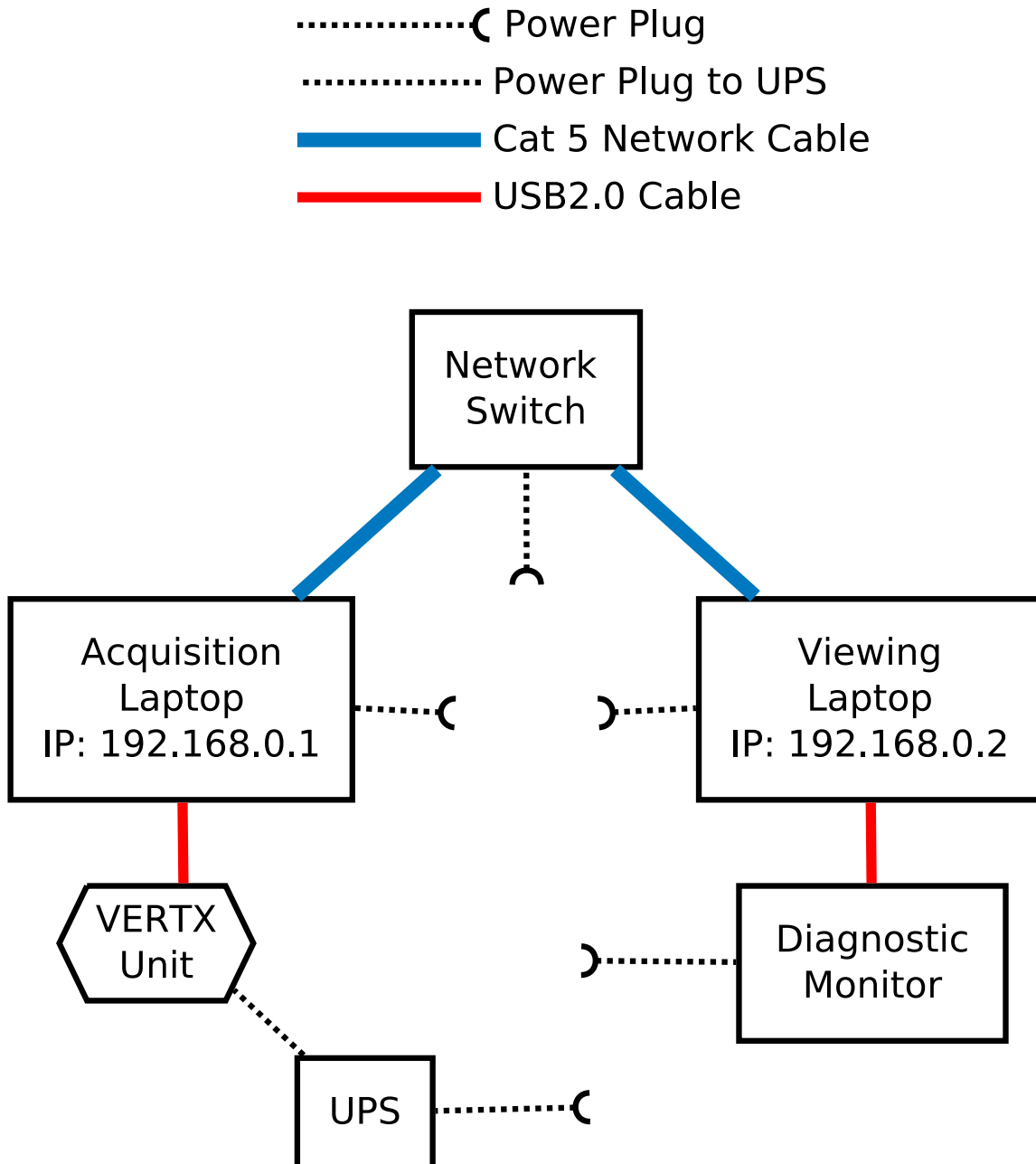
Default Gateway: 192.168.0.1



5. Click **OK**.

6. Hardware Installation

6.1 Hardware Setup Diagram



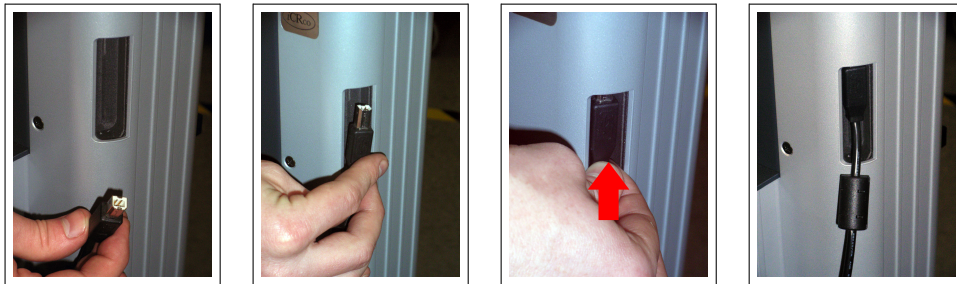
6.2 PC Specifications

The minimum requirements for the Acquisition computer are as follows:

Processor: Pentium D
RAM: 2 GB or more
OS: Windows XP
HDD: 250 GB or more

6.3 VERTX USB 2.0 Installation

The USB 2.0 port is located on the upper, right-hand side of the operator when facing the front of the VERTX unit. Plug a standard USB 2.0 cable into the VERTX USB port and then into the PC.



6.4 Power Switch Locations



The power switch for the VERTX unit is located on the front in the lower right hand side of the unit, shown here with the front cowling removed.

6.5 Installing AC Power Cord

1. Remove two (2) 8-32 x $1\frac{1}{2}$ " flathead screws from the front power cowling.

2. Plug the other end of the power switch cord into the UPS battery back-up outlet.
3. Replace two (2) 8-32 x 1½" flathead screws into the front power cowling.
4. Plug the male end of the power switch cord into the battery backup portion of the UPS.
5. Make sure the battery in the UPS is connected. If it is not connected, the UPS will beep intermittently.
6. Turn the VERTX unit switch to the on position.

6.6 International Power Cable

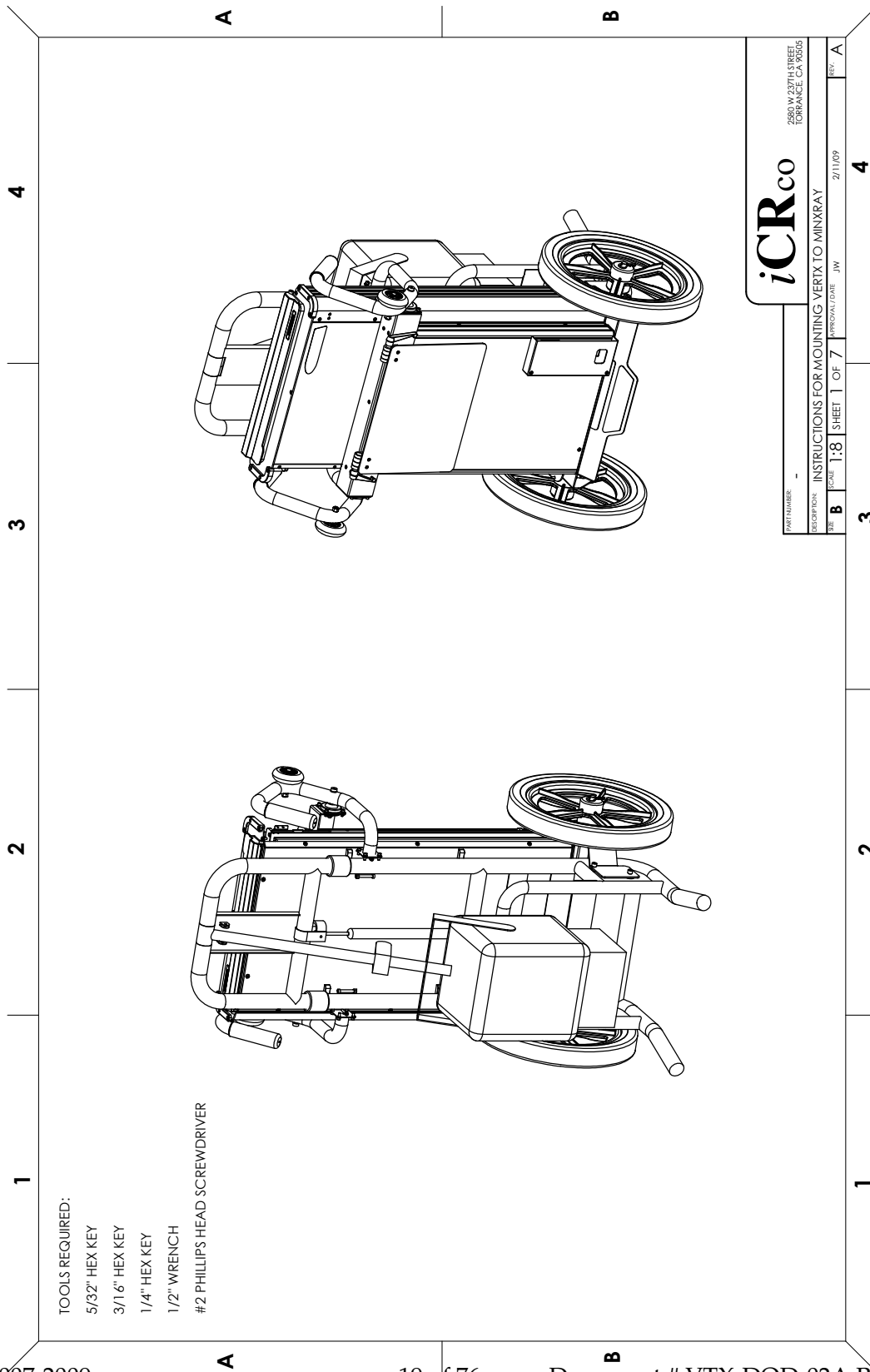
The VERTX unit utilizes an international IEC grade connector for the power cable. Systems are shipped with a standard NEMA 5-15 hospital grade cable. The cable needs to be changed depending on the male end, which varies from country to country.

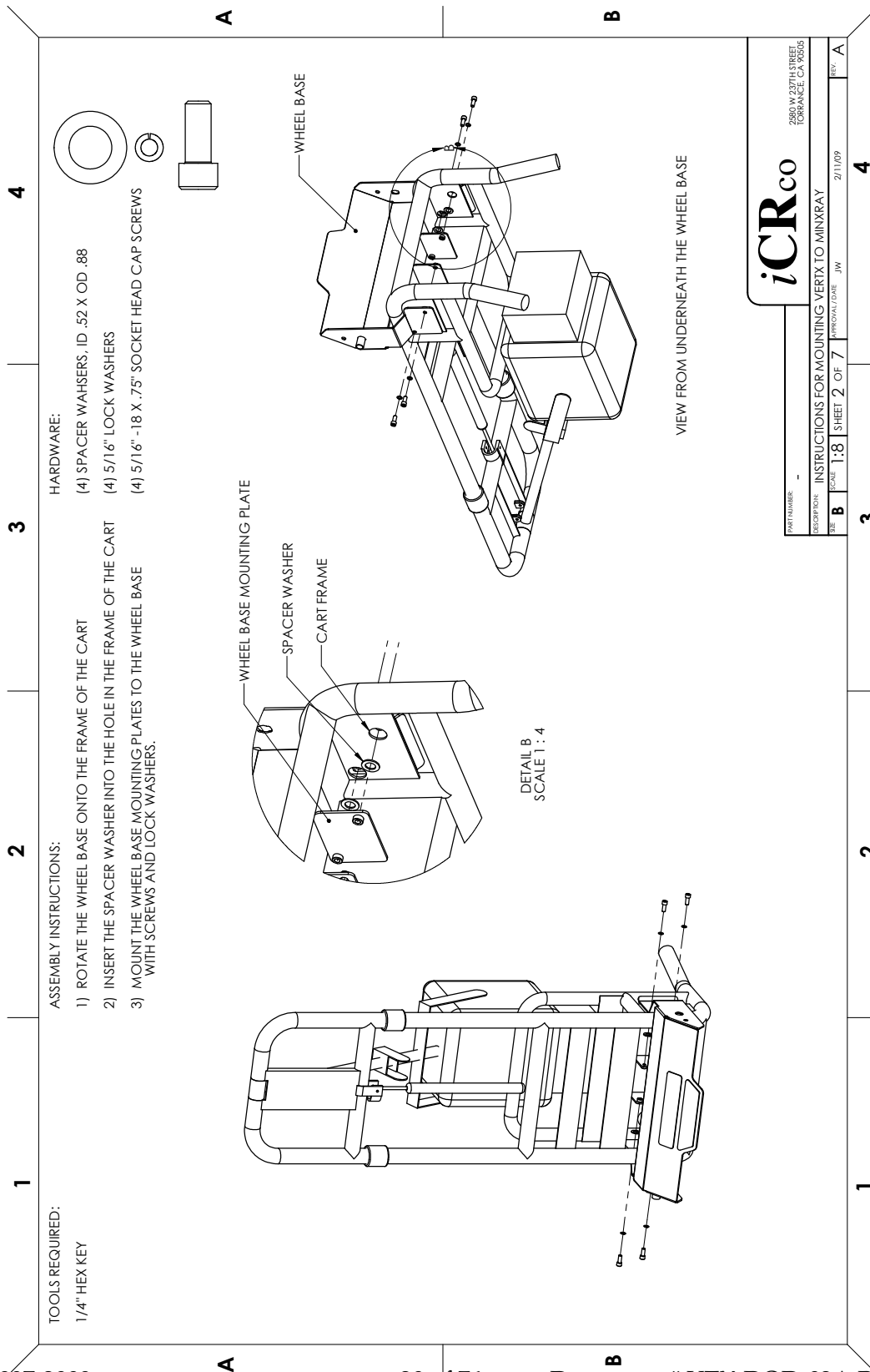
6.7 Power and Scan Lights

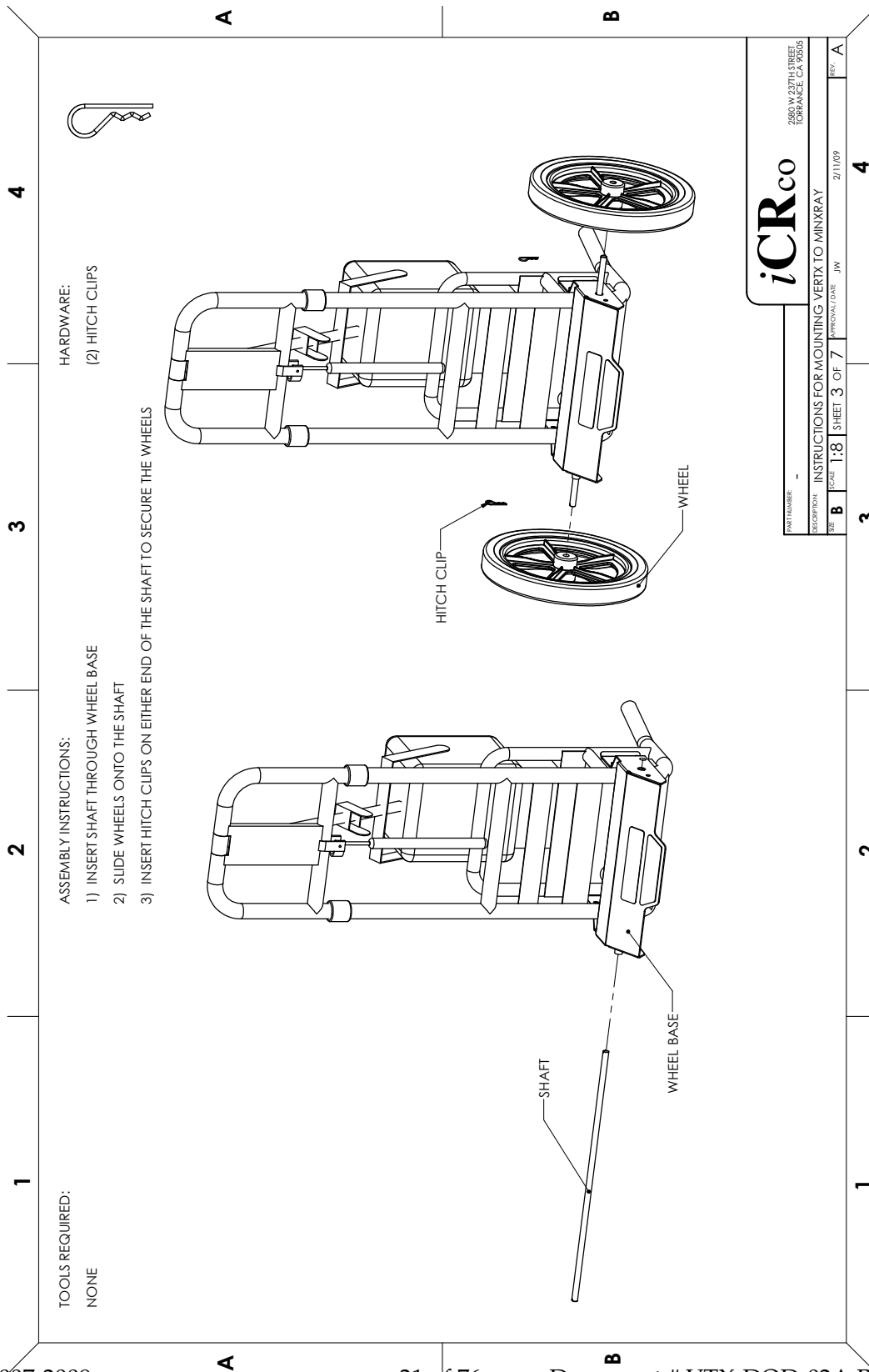
The power and scan lights are located in the front of the VERTX unit near the top right side. When the unit is powered on, the green light is illuminated. While the unit is scanning the yellow light will blink.

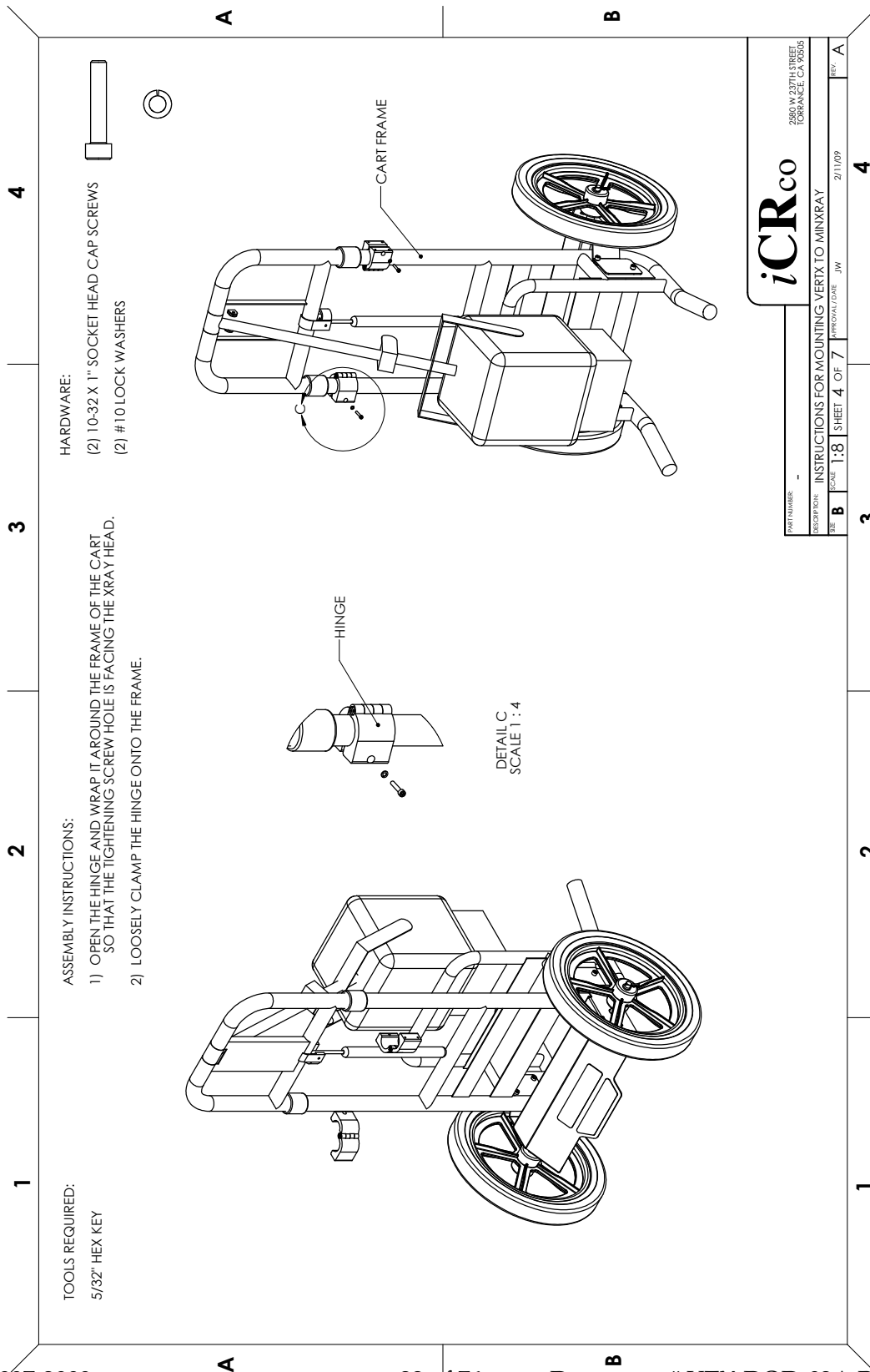


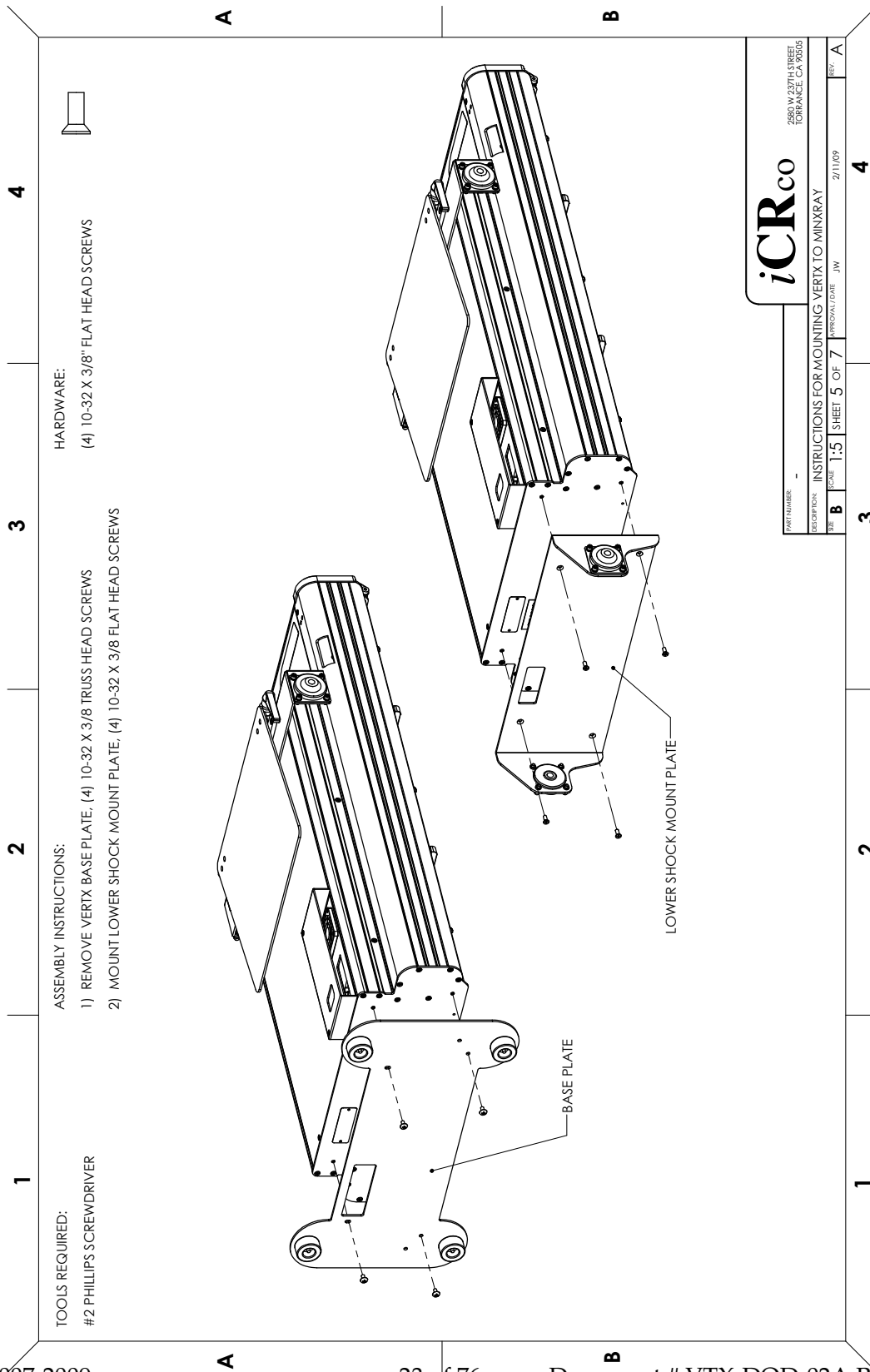
6.8 Cart Mounting Instructions

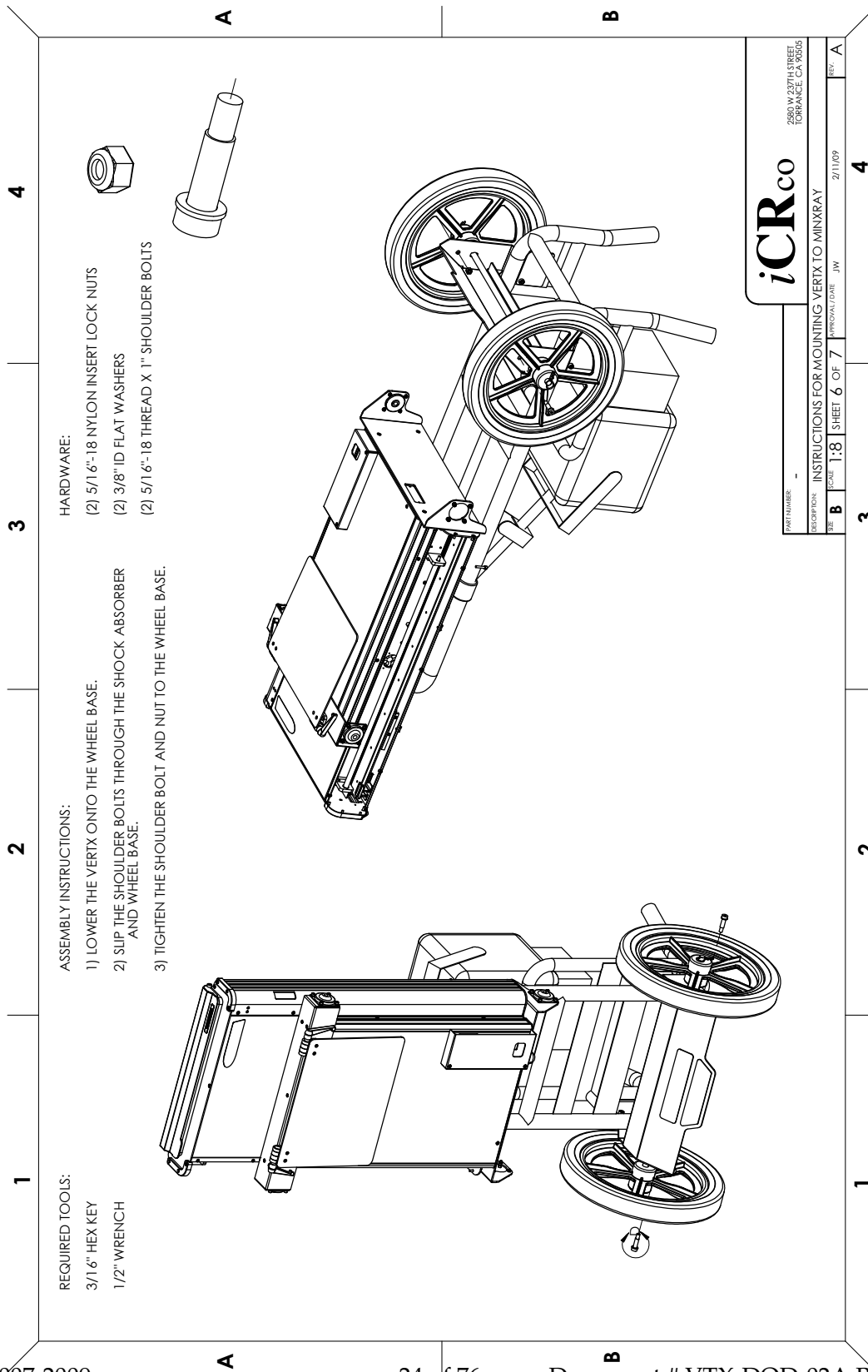


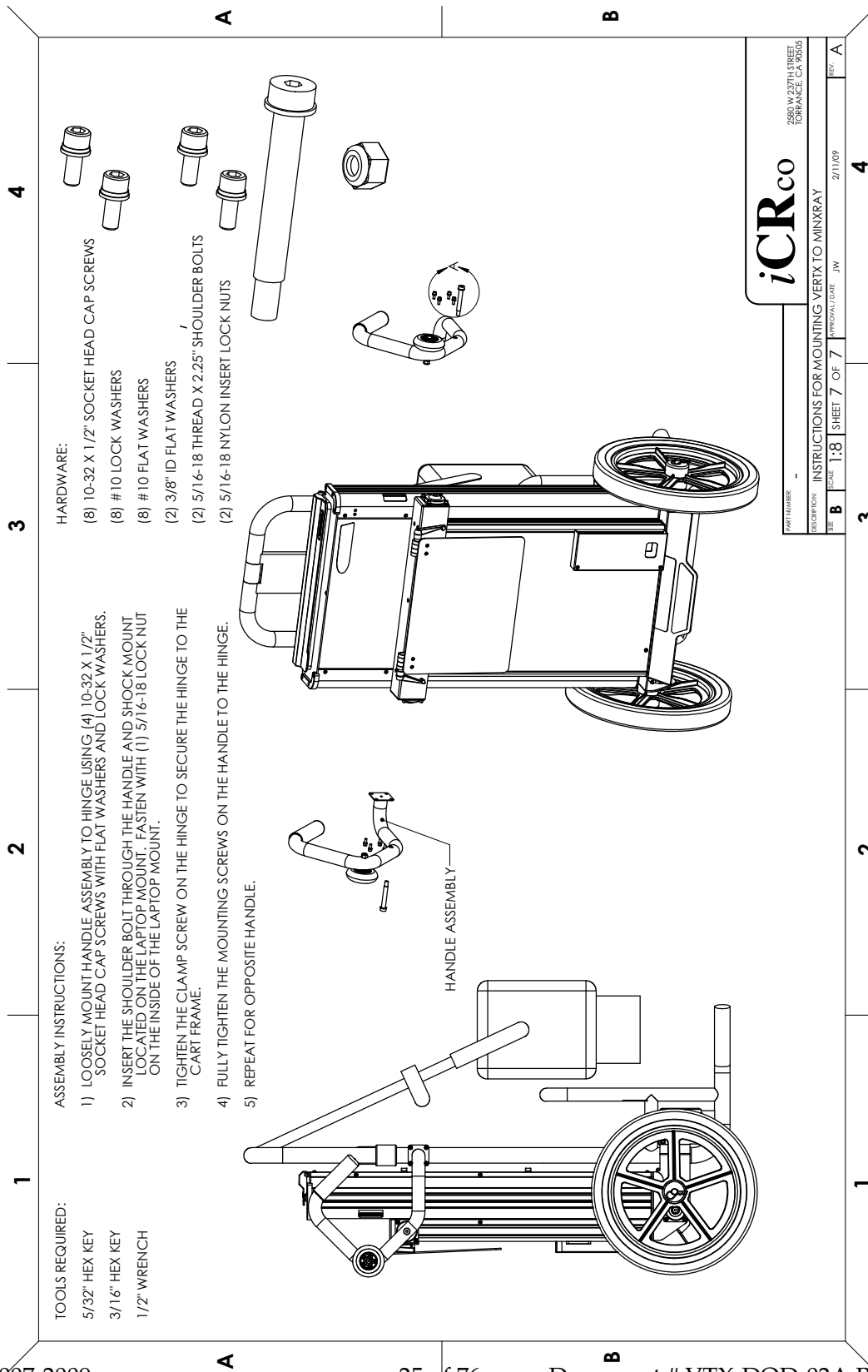












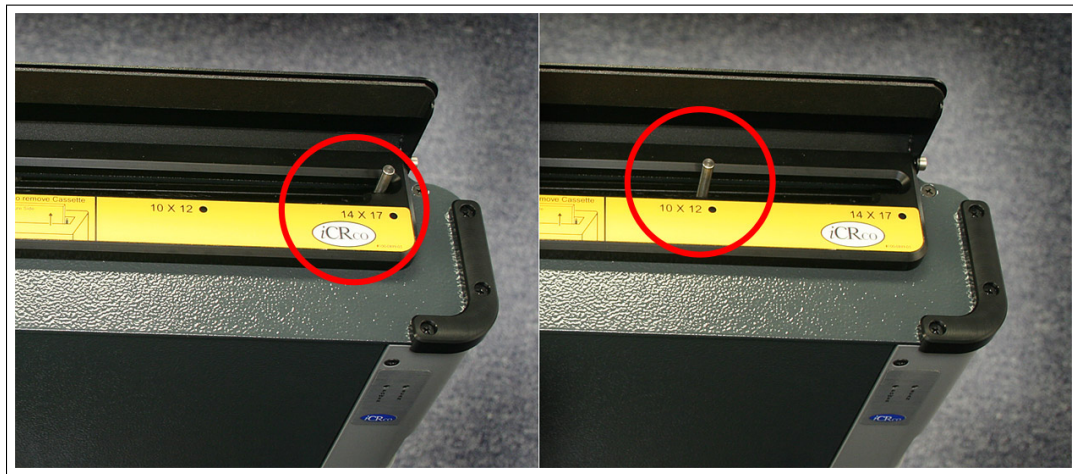
7. Acquiring an Image

7.1 Acquiring an Image

⚠ WARNING This equipment employs a laser. Avoid the laser beam. Direct eye exposure to laser light must be avoided. Avoid looking down the cassette entry slot.

Note The steps in this section represent a typical CR workflow. Every workflow varies in process.

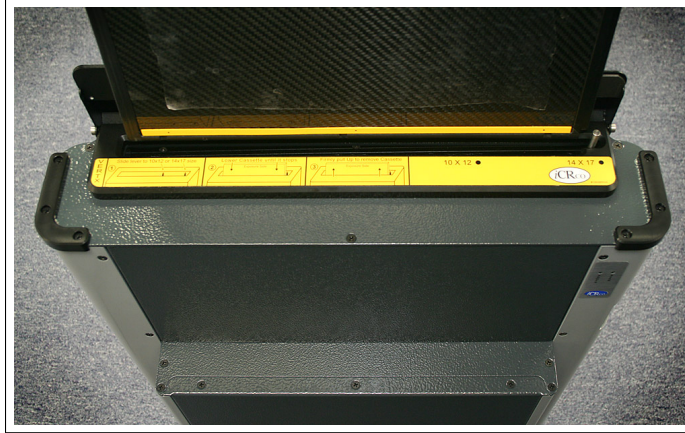
1. Open the dust cover that covers the entry slot.
2. Choose the cassette size (10x12" or 14x17") by moving the metal rod on the right side of the scan slot to the appropriate position.



Position the metal rod towards the inside of the VERTX for a 10x12" cassette.

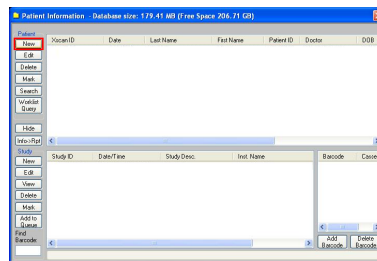
Position towards the outside of the VERTX for a 14x17" cassette.

3. Load the cassette into the VERTX. The black, carbon fiber side of the cassette faces towards the front of the VERTX unit.

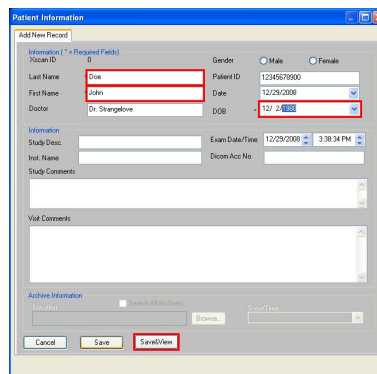


⚠ CAUTION Do not use excessive force when loading the cassette! The cassette will not fit if the orientation is incorrect.

4. Open QPC XSCAN32.
5. Create or edit patient profile. To do this, click **New** or **Edit**, respectively.



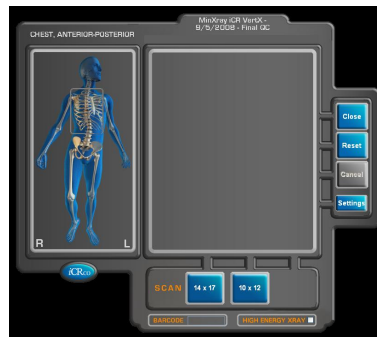
6. If creating a new patient, enter the relevant patient info, or if editing a patient, change the information accordingly, then click **Save and View**.



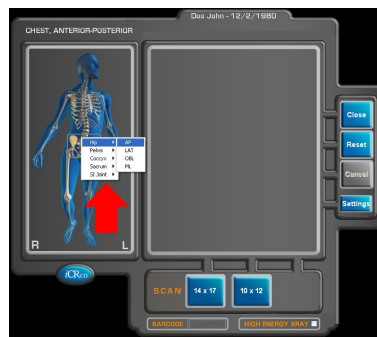
7. Click on **Scan** to bring up the Quality Processing Center Scan dialog. (if it is a patient with no images the scan dialog will automatically appear).



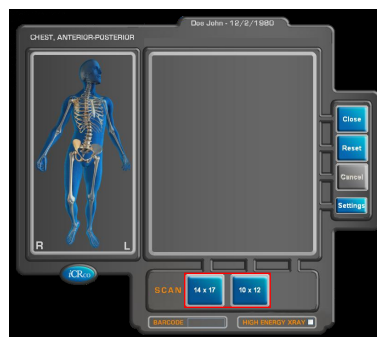
8. The iCR Quality Processing Center dialog will appear.



9. Select the anatomy by mousing over the skeleton on the left hand side of the Quality Processing Center dialog.

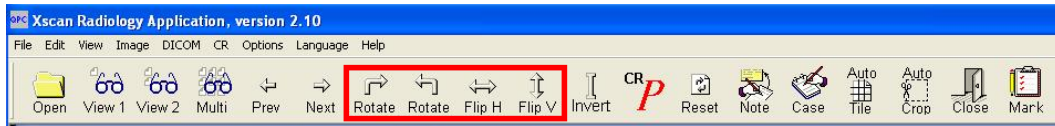


10. To begin scanning, select the cassette size by clicking the correct button (i.e. 14x17 in, 10x12 in).

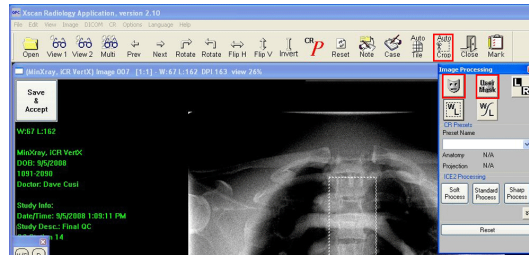


11. The preview window will display the image as it is scanning. Once it has finished scanning it will automatically import the image into QPC XSCAN32.
12. Open the scanned image by double clicking on the thumbnail.

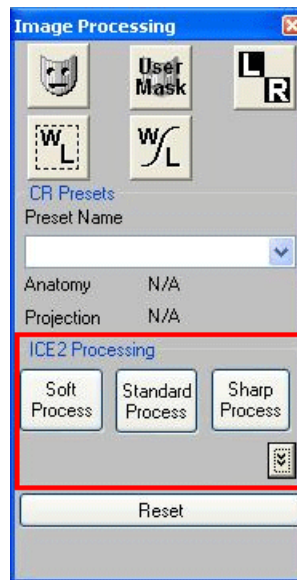
13. Rotate/Flip to correct orientation using the Rotate and Flip buttons in the main tool bar.



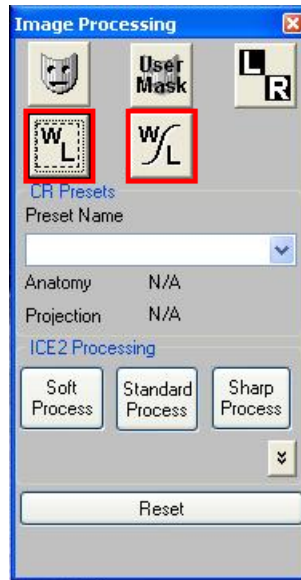
14. Remove any collimation by using the Auto Crop (located in the main toolbar), Mask, or User Mask (located in the Image Processing dialog) functions.



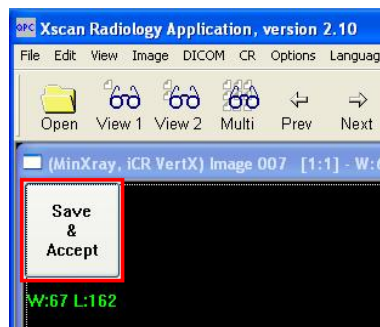
15. Process using ICE2 (located in the Image Processing dialog).



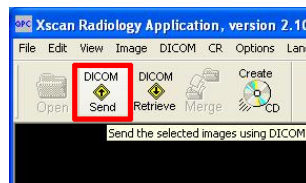
16. Window/Level(W/L) the image using the Window/Level or Smart Box tools.



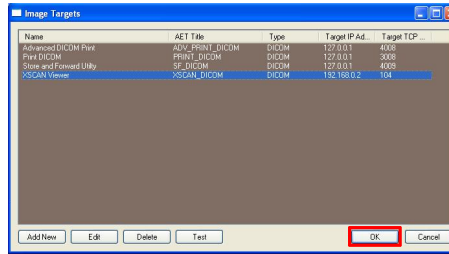
17. Accept and Save the image to save the processing and W/L settings by clicking the **Save and Accept** button in the upper left hand corner of the image.



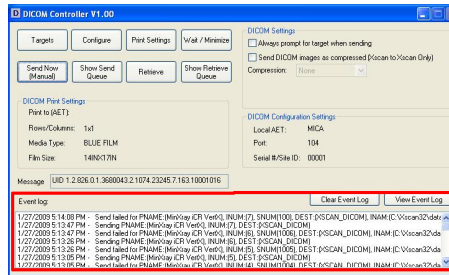
18. Return to the *Patient Information* window. Select the patient(s) to send to a PACS or viewing station. If you wish to send more than one patient, hold the Ctrl key down and left mouse click to select multiple patients.
19. After selecting the patient(s), click the **DICOM Send** button.



20. The *DICOM Targets* window will appear, select the desired target, then click **OK**



21. The results of the DICOM Send will appear in the DICOM Controller window's Event log.



7.2 Schedule of Maintenance

The following is a schedule of maintenance for the VertX.

The following maintenance may be performed by end users:

Maintenance Procedure	Frequency
Clean cassettes	Weekly
Clean VertX exterior covers	Monthly

The following VertX maintenance must be performed by an *iCRco* authorized service engineer only:

Maintenance Procedure	Frequency
Clean mirrors	Yearly
Vacuum inside case	Yearly
Clean fan filters	Monthly or when visibly dirty.

The following VertX calibration maintenance must be performed by an *iCRco* authorized service engineer only:

Maintenance Procedure	Frequency
Check image performance (Contrast/Noise Ratio and Spacial Resolution)	Quarterly
Perform Exposure Index calibration	Yearly

7.3 Periodic Cleaning

Periodic cleaning of iCRco products should be done on a monthly basis.

7.3.1 Cleaning the Outside of the VertX

Note It is important that the covers remain on the VertX at all times. The covers should only be removed for service by an iCRco authorized technician, then immediately replaced.

⚠ CAUTION Do **not** clean the galvo mirror. Dust and fibers in the laser beam path may affect the radiographic image.

The outside covers of the VertX should be cleaned with a slightly dampened cloth or a dry cloth moistened with Ball®SUNUP®glass cleaner or Sprayway®glass cleaner.

7.3.2 Cassette Cleaning

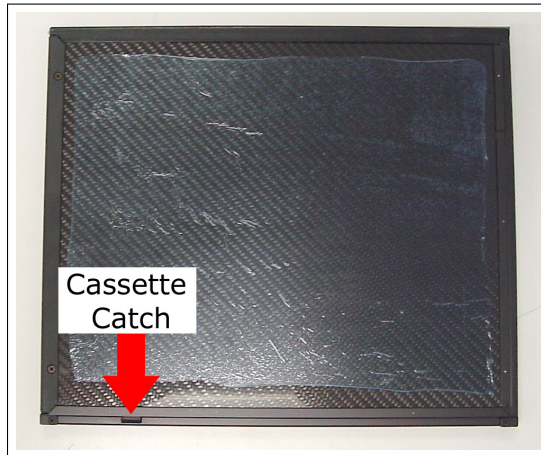
⚠ CAUTION At no time should abrasive cleaners or chemicals be used to clean the cassette or plate.

Cleaning the Outside of the Cassette

1. Moisten a clean, lint-free cloth with a mild soap or detergent using soft water.
2. Wipe down the cassette covers thoroughly.
3. Allow the cassette to air dry.

Cleaning the IP Plate

1. With a finger, press the cassette catch located on the bottom rail on the cassette. This will release the carbon fiber door from the cassette.



2. Examine the imaging plate for dust or particulates.
3. Using *iCRco* plate cleaner, apply the plate cleaner to a clean, lint-free cloth.



Note If *iCRco* Plate Cleaner is not available, please contact Technical Support at 1-310-921-9559 to obtain more.


4. Gently wipe down the imaging plate with the clean, lint-free cloth.
5. Allow the plate to air dry before sliding the carbon fiber door back into place.


8. Diagnostics


8.1 Overview

If a system failure occurs, it is necessary to diagnose the cause before beginning the repair. This section describes the diagnostic tools and techniques used to isolate various types of system failures. This chapter covers the most common failures and their fixes. If the user is unsure how to proceed with troubleshooting, please contact Technical Support.

The cause of some failures may be obvious. In these cases, the Service Engineer may proceed directly to the repair. Before beginning an investigation, it is a good practice to record as much information about the current state of the system as possible. This information may include, but is not limited to, symptoms, conditions under which symptoms exist, voltages, settings, cleanliness, and visual state. Normal generic troubleshooting techniques apply. With knowledge of the system, isolate the failure to a particular subsystem. With knowledge of the subsystem, trace the symptom back to its cause. In many cases, failures are caused by lack of periodic maintenance and cleaning. If a system is known to be behind schedule for its maintenance and cleaning at the time of the failure, it is a good practice to clean and re-calibrate the system before extensive troubleshooting. In many cases this solves the problem or provides clues as to the cause.

 **WARNING** This equipment is operated with hazardous voltages which can shock, burn, or cause death.

 **CAUTION** This equipment uses a laser. Direct exposure to the laser beam must be avoided.

 **CAUTION** Do **not** operate the unit with the covers removed. Operating the VertX with the covers removed may result in damage to VertX and/or cause harm to the operator.

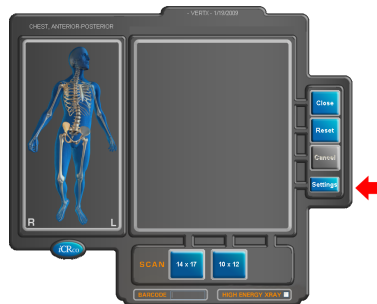
Preliminary Checks

1. Make sure the VertX is powered by at least a 1300VA (780W) UPS (uninterruptable power supply).
2. Make sure that the VertX is connected to the acquisition computer using a USB 2.0 cable (USB 1.0 or 1.1 cabling is **not** sufficient).
3. Check that the VertX is powered by the provided power cable or source as covered in Section 2.1.
4. Make sure that other devices that emit strong radio frequencies are not in close proximity to the VertX.

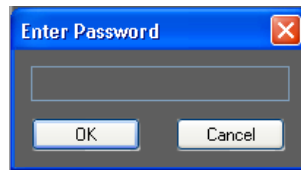
8.2 Using the Focus Tool for Hardware Diagnostics

The Focus tool is an efficient test that can provide the Service Engineer with valuable feed back regarding the functionality of the VertX's hardware. There are a series of questions following the work instructions that are designed to help include/eliminate potential failures in the VertX's subsystems.

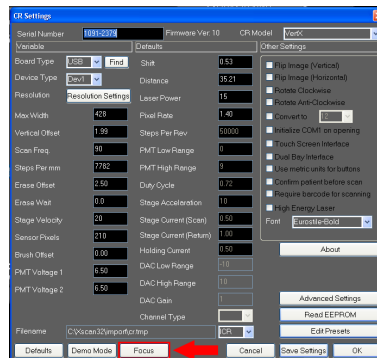
1. Leave the Cassette out of the unit and close the bay door.
2. Open QPC XSCAN32, access the Scan interface, then click the **Settings** button on the Scan interface.



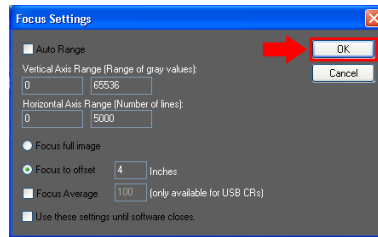
3. Enter the password *earl* in the dialog box.



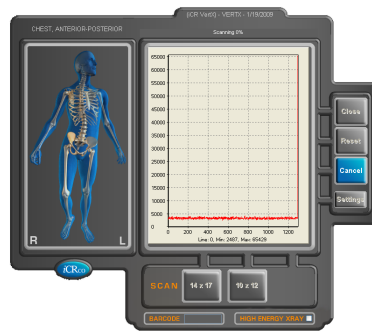
4. Click on the FOCUS tool Button along the bottom edge of the settings window.



5. A new window will come up, indicating the settings for the FOCUS tool. Use the standard settings in the focus tool. Click **OK** in the dialog box. This moves the carriage 4 inches into the unit, and begins to capture data.



6. If the unit is working correctly, you will see a red data line, moving as the data is passed to the PC, one line at a time. In the default configuration, the scale is 65,000 levels of gray along the vertical axis of the window, and pixel location along the horizontal axis of the window. The Data line will be between zero and 2,500. If the line is not between zero and 2,500, you may need to re-adjust the zero point of the scanner.



7. Open the dust cover of the VertX, the Data line should rise and lower slightly according to the position of the bay door. If the room is illuminated by high frequency fluorescent lights, the line may become sinusoidal (Wavy) and move away from the zero point.

What can we see by looking at the digital output of the VertX?

1. The unit must be capturing data because there is data being captured by the PC
2. The Laser is working because the laser moving past a start scan sensor tells the unit to start capturing data
3. The Start Scan sensor is working
4. The Galvanometer is working, swinging the laser back and forth
5. The Motor is working, moving the carriage 4 inches into the VertX
6. The unit is sensing light variations as the line is rising due to more light leaking into the scan head.
7. The electronics are functional, and the cables are connected properly
8. The unit's amplifier is working, as is the ADC and the USB 2.0 interface on the unit

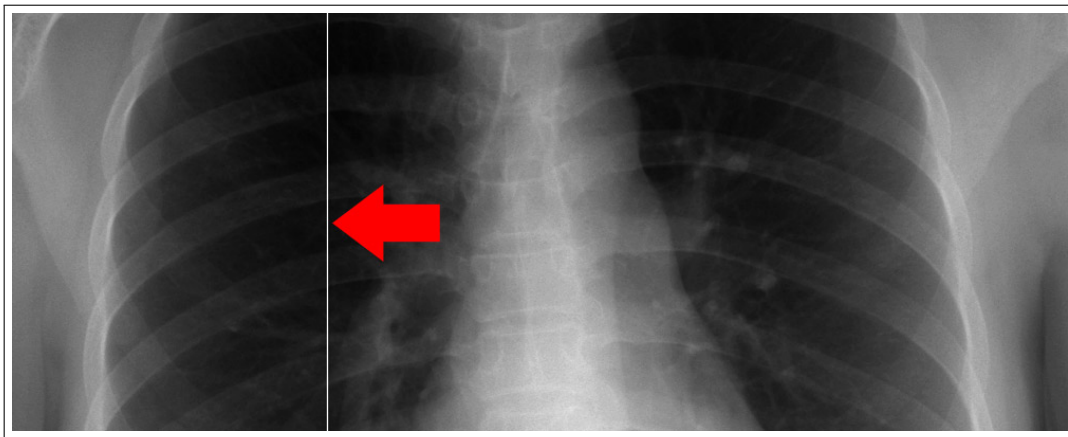
If the focus tool does not come up, what questions can we ask?

1. Is there power to the unit (Green Power light on and steady?, Orange scan light off, or on and blinking?)
2. Does the unit move before an error condition is seen? If so, motor is working and carriage is functioning. If not, several things can be wrong: No connection to PC, No power to Unit, bad USB cable.
3. Is there a NO DATA ACQUIRED error after the motor comes to rest at the scan position?

This indicates that the unit is not transmitting data to the PC. Please see Section 8.4 for more information.

8.3 Image Symptoms

8.3.1 Lint in the Scan Path



Symptom: Sharp, white lines, usually only a pixel or two in width and spanning the length of the entire image.

Cause: Lint or other particulate matter in the scan slot.

Solution: See Section 9.3 for instructions on accessing the scan slot. Once the user has access to the scan slot, visually inspect the area in and around the scan slot for particulates and remove them by hand, or with a vacuum if necessary.

8.3.2 Dust Lines

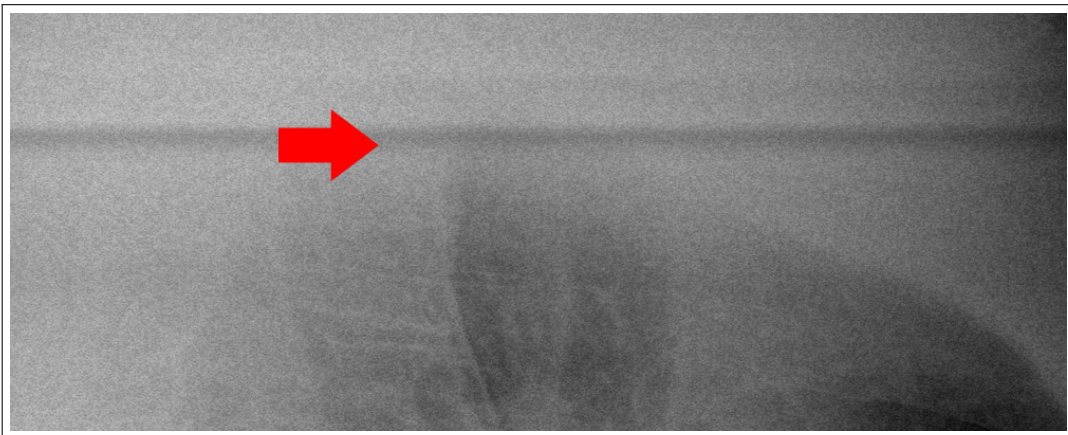


Symptom: Light, blurred lines across the long axis of the cassette.

Cause: Dust or lint on the mirrors.

Solution: To clean the mirrors, please see Section 9.5 for instructions.

8.3.3 Horizontal Lines in Image



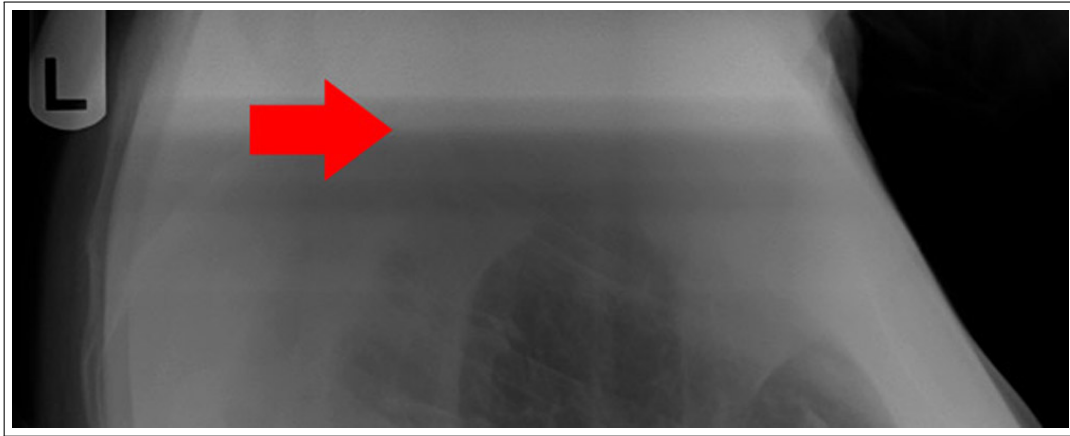
Symptom: Horizontal lines in Images.

Cause: Bump in motion path.

Solution:

1. Ensure that there is no blockage in the cassette scan path.
2. If there is no blockage of the scan path, the user may need to reposition the Caterpillar Brush. Please see Section 9.10 for instructions. If the Caterpillar Brush is worn out, please contact Technical Support to obtain a replacement brush.
3. If a solution has not been reached, please contact Technical Support.

8.3.4 Banding Top/Bottom 17" Length



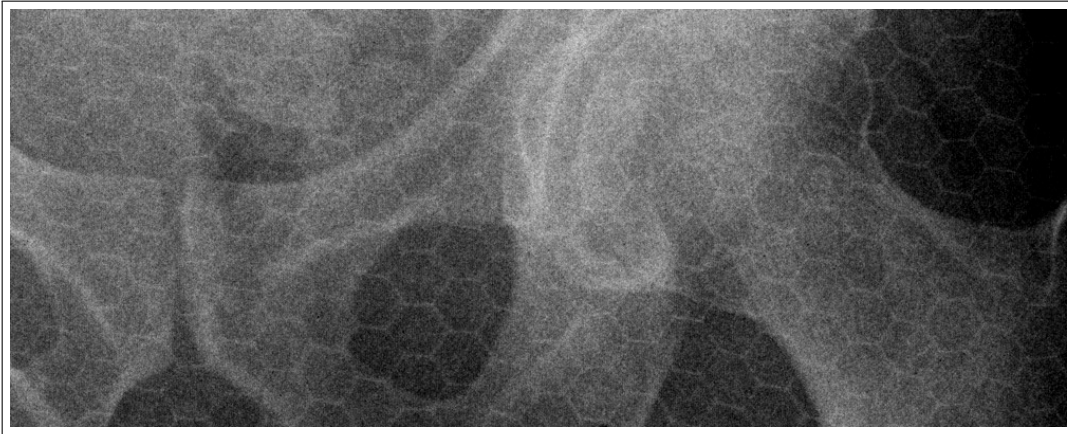
Symptom: Horizontal line in image.

Cause: Unstable power supply / Excessive ambient light / Bad PMT board / PMT sensor / Bad Galvo

Solution:

1. Ensure that the CR unit is powered via a UPS. Ensure the UPS is not in bypass mode.
2. Ensure that the ambient room light is no more than 2EV. Turning off or dimming the room light should be adequate.
3. Unplug the network cable from the computer, then make a test scan to see if the banding is eliminated.

8.3.5 Up-side Down Cassette

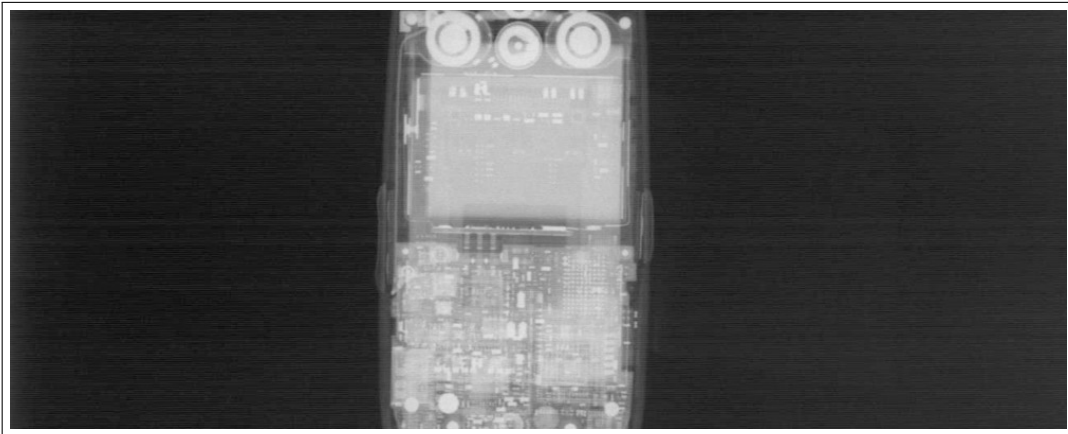


Symptom: Honeycomb/hexagonal pattern throughout the image.

Cause: Exposing a cassette up-side down.

Solution: First ensure that the cassette is erased, then re-expose the cassette with the carbon-fiber side facing up, then re-scan.

8.3.6 Grid Lines/Moiré Effect

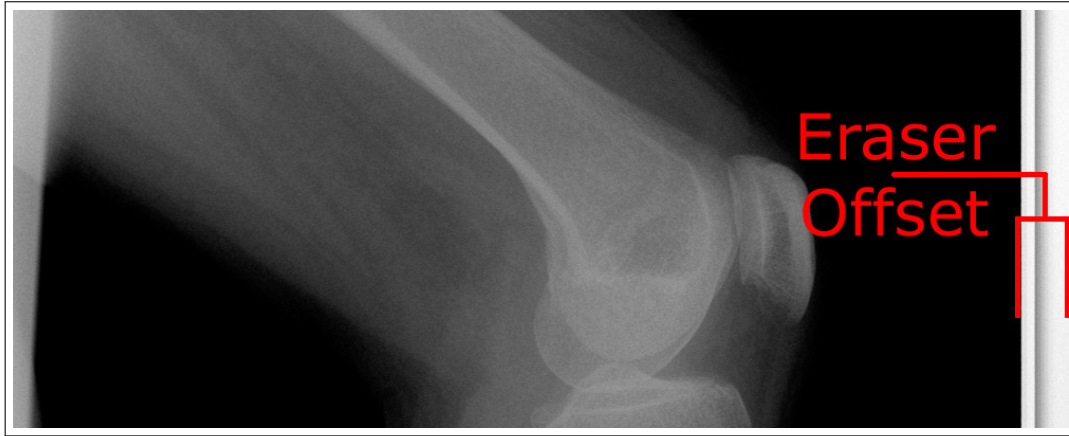


Symptom: Grid lines/Moiré Effect

Cause: A grid with the wrong LPI, or a misoriented cassette under the grid.

Solution: To alleviate grid lines/ moiré effect, first ensure that the grid being used is 178 LPI. If the grid in use is 178 LPI, then rotate the cassette 90° under the grid.

8.3.7 Eraser Offset



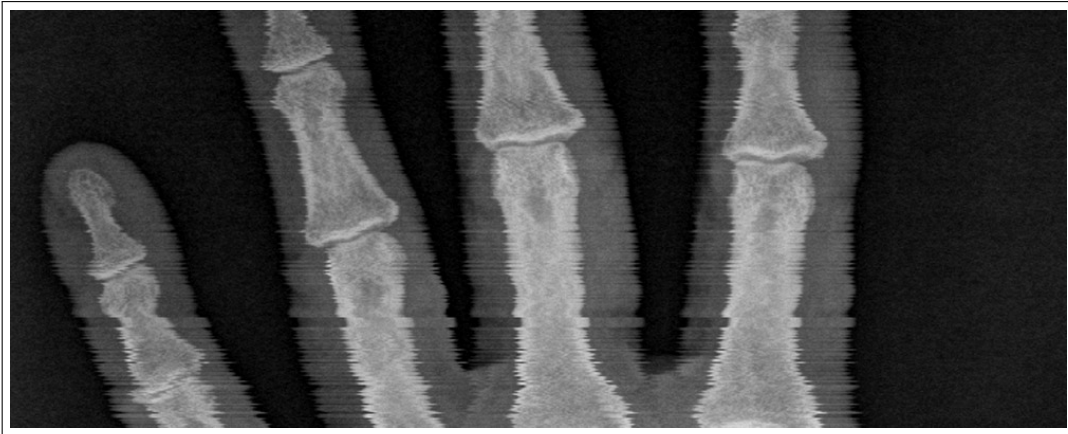
Symptom: A gap of white space between the edge of the image and the physical edge of the cassette after scanning.

Cause: Eraser offset needs to be increased or decreased.

Solution:

1. Open XSCAN32.
2. Create/edit a patient, then click **Save & View**.
3. Click the **Scan** button (if it is a patient with no images, the Scan interface will automatically open).
4. Click the **Settings** button, then enter the password *earl* (case sensitive).
5. Locate the setting for Eraser Offset.
6. The user may need to adjust this setting several times before achieving the desired result. Expose a couple of cassettes, then scan and adjust the Eraser Offset until the image is acceptable.

8.3.8 Image Jitter



Symptom: Jittery image.

Cause: Inconsistency in the CR unit's galvanometer.

Solution: Image jitter issues are **not** serviceable in the field. Please contact Technical Support for assistance with image jitter.

8.3.9 Over Exposure



Symptom: Lines in images / images look more “translucent” – the images lack the proper contrast and density.

Cause: Over exposure.

Solution: Make an exposure using your current exposure settings. Scan and evaluate the image. Then, reduce the exposure parameters, expose another plate, then scan and evaluate the image. Compare the results of both exposures, then adjust the “standard” exposure accordingly.

8.3.10 Random Imaging Shifting

Symptom: Random Image Shifting.

Cause: Bad USB 2.0 connection.

Solution: Visually inspect the USB 2.0 cable connecting the CR unit to the computer. Make sure there are no visible cuts, freys or other damage. Move the USB 2.0 cable to a different USB port on the computer. If the problem persists, try swapping out the USB 2.0 cable for a new one.

8.4 Error Message: No Data Acquired

8.4.1 Failure Analysis 1

1. When turning on the CR, see if there is a pop-up message in the lower right hand corner of the Windows task bar stating “This USB device can perform faster if it is connected to a hi-speed USB 2.0 port.” If so:
 - make sure the CR is plugged into a USB 2.0 port. Some older PCs only have USB 1.0 or 1.1 ports. These older variety of USB ports are **not** sufficient in speed to acquire data from the CR unit.
 - make sure the BIOS does not have any options set for conserving power (especially on laptops). Sometimes the PC will not run the USB ports at their full potential to save power. Please consult the PC’s user manual for more information.
 - try unplugging the USB cable from the CR unit and then plugging it back in. If the message does not appear try to scan. In some instances, turning the CR unit on with the USB cable plugged in causes Windows to recognize the device as USB 1.0. In some instances, unplugging and replugging the USB cable can correct this.
2. After clicking on the scan button, listen for the motor and see if the CR slide moves at all. If it does not move at all, then the motor controller board may be at fault.

- open the back of the CR unit (see Section 9.2 for instructions) and locate the motor controller board on the lower left. The motor has cables directly connected to the board.
- look for either a red or green indicator light on the board. It may be covered by silicone, which can be removed.
- a green light on the motor controller board indicates that the board is in working condition, while a red light indicates a faulty board that will need to be replaced. If the board needs replacement, please contact Technical Support.

3. Check the following:

- check the fuses on the power distribution board (see Section 9.8 for instructions)
- check that the laser and eraser lights turn on: With the slide away from the home position, see if the laser turns on (full beam from top to bottom). The laser beam must also overlap the trigger board behind the long mirror.
- if the laser does not turn on, check if the galvo mirror oscillates.
- if the galvo is on and the laser is not, wiggle the cable coming from the laser body to see if the laser turns on.
- follow the cable to the laser connector on the PMT board and make sure it is not loose. Unplug and replug the connector.

Note the slide must be away from the home position for the laser to turn on.

- if the galvo does not turn on, check the galvo cables. Wiggle them, then unplug and replug the connectors.
4. If the galvo does not turn on, the galvo or PMT board may need to be replaced. If the galvo turns on but the laser does not, replace or repair the laser

8.4.2 Failure Analysis 2

Note Failure possibilities are listed in order of likelihood.

Fault: Laser trigger pulses are not being received by XSCAN32.

Assumptions: In order for the CR unit to arrive at this point:

- The CR unit is powered up and communicating via the USB to the XSCAN32 software.
- Motor movement and magnet/reed switch are most likely functional as RETURN TO HOME followed by START SCAN commands operate without apparent error. These commands are executed prior to expecting laser triggers.

Setup:

1. Power off the CR unit.

2. Remove back cover (see Section 9.2 for instructions) and back optical cover (see step 3 from Section 9.5 for instructions).
3. Switch **off** PMT board hi-voltage by switching the one red switch on the PMT board inward, towards the center of the PCBA.
4. Power on the CR unit.
5. Press and hold the two Power Distribution board push-button switches. If all five Diagnostic LEDs do **not** brightly illuminate, stop! Possible failures include:
 - Power Distribution fuses are blown (see Section 9.8 for instructions)
⚠ CAUTION If fuse(s) are found to be bad and replacement fuse(s) continue to blow, **STOP!** A potentially dangerous electrical situation may exist and the CR unit should be returned to the factory for repair.
 - Bad Power Distribution board or cabling.
 - Bad +24V Power Supply or cabling
 - Bad Quad Power Supply or cabling
 - If a fix has not been accomplished by this point, the machine should be returned to the factory for repair.
6. Turn the slide motor shaft by hand until the slide is observed to be well away from the HOME position.

Checks:

1. If the Eraser LEDs do **not** illuminate, **STOP!** Possible failures:
 - If eraser lights are switch-able, then verify the eraser switch is in the ON position.
 - Power Distribution fuse(s) has blown.
⚠ CAUTION If fuse(s) are found to be bad and replacement fuse(s) continue to blow, **STOP!** A potentially dangerous electrical situation may exist and the CR unit should be returned to the factory for repair.
 - Bad Power Distribution board or cabling
 - Bad +24V Power Supply or cabling
 - Bad Quad Power Supply or cabling
 - If a fix has not been accomplished by this point, the machine should be returned to the factory for repair.
2. If the galvo mirror is **not** oscillating, **STOP!** Possible failures:
 - Bad PMT board or cabling
 - Bad Galvo/Controller or cabling
 - Bad Quad Power Supply or cabling

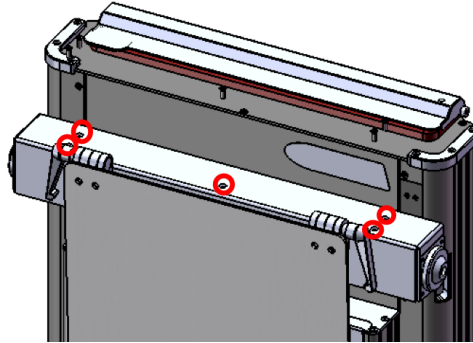
- If a fix has not been accomplished by this point, the machine should be returned to the factory for repair.
3. If the Laser is **not** illuminated, **STOP!** Possible failures:
- If the laser has an external power supply, check to verify that the programmable power setting is not set too low
 - Bad laser, laser/supply combo, or cabling
 - Bad PMT board or cabling
 - Bad Quad Power Supply or cabling
 - If a fix has not been accomplished by this point, the machine should be returned to the factory for repair.
4. Temporarily place a Post-it® or similarly light-colored paper behind the Trigger board. This enables viewing of the laser beam.
5. If the laser beam is **not** observed to OVERLAP the Trigger board, **STOP!** Possible failures:
- Galvo AMP setting too low; try increasing AMP setting
 - Bad PMT board or cabling
 - Bad Galvanometer/Controller or cabling
 - Beam may require re-alignment. This alignment is accomplished by galvo adjustment and is beyond the scope of this failure analysis. Please contact Technical Support for further assistance.
 - If a fix has not been accomplished by this point, the machine should be returned to the factory for repair.
6. If the laser beam does **not** cross through the center of the trigger sensor, **STOP!** Possible failures:
- Bad Trigger board
 - **Note** The Trigger board cable is un-keyed and is therefore prone to misconnection.
 - Bad PMT board or cabling, specifically the TILO cable
 - Bad Quad Power Supply or cabling

If a fix has not been accomplished by this point, the machine should be returned to the factory for repair.

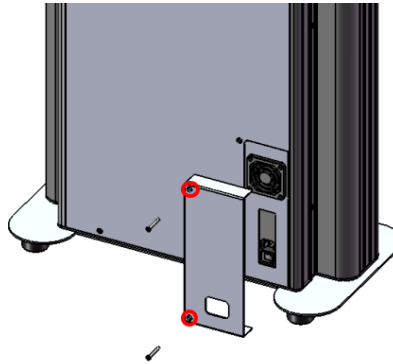
9. Service & Maintenance Procedures

9.1 Removing Front Cover

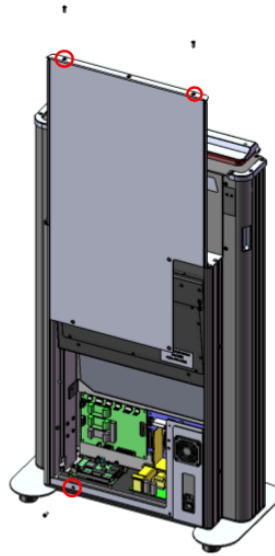
1. Remove 5 8-32 x $\frac{1}{2}$ " flathead screws from the laptop mount.



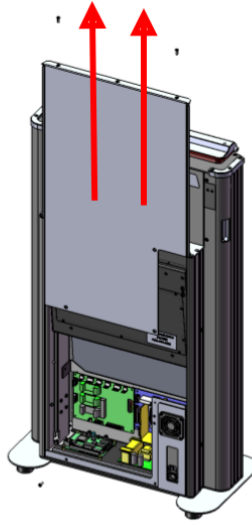
2. Remove 2 8-32 x $1 \frac{1}{4}$ " flathead screws to remove the front power cowling.



3. Remove 2 8-32 x $\frac{1}{2}$ " from the top the lip and 1 8-32 x $\frac{3}{8}$ " from the bottom of the front cover.

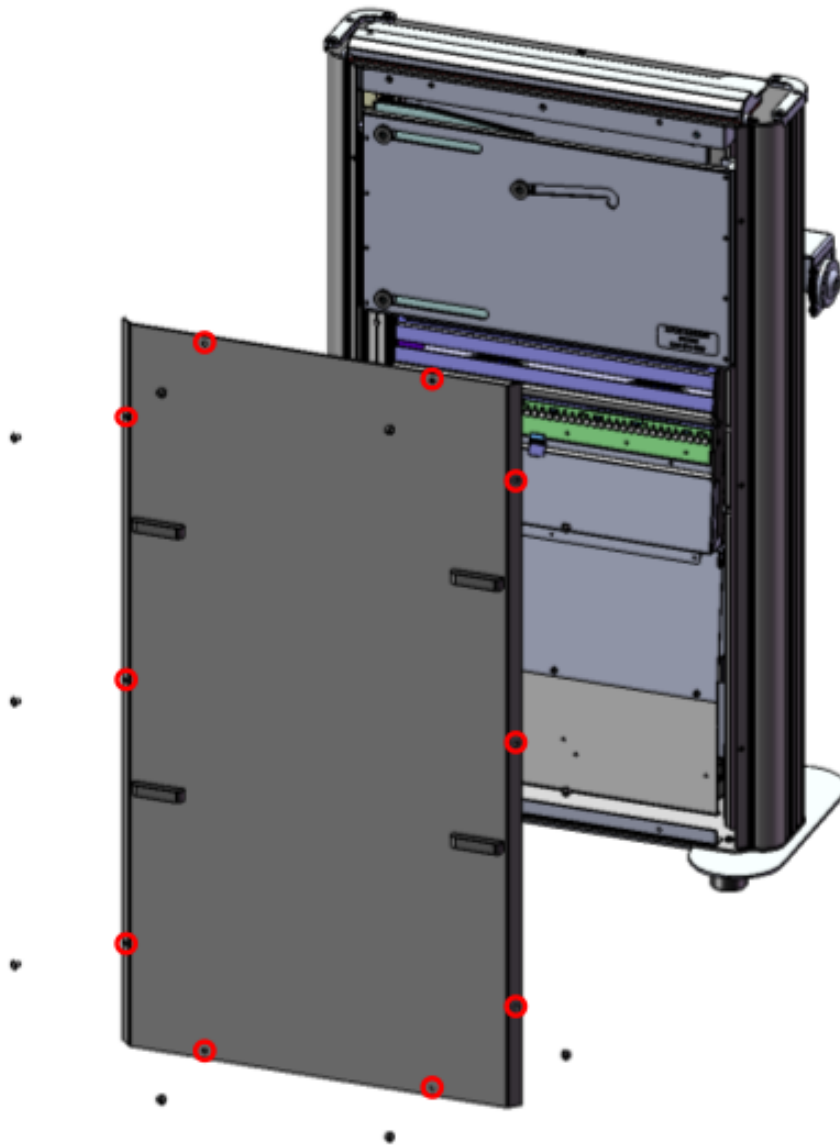


4. Slide the cover up and out of the slots.



9.2 Remove Back Cover

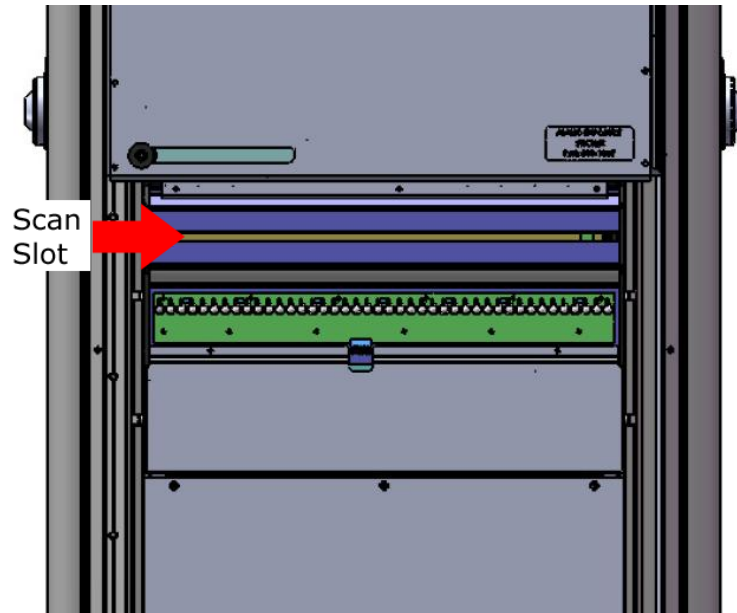
1. Remove 10 8-32 x $\frac{1}{4}$ " truss screws and tooth lock washers from the back panel. There are three on each side, two on the top, two on bottom.



2. After removing the back cover, cover the cylinder slot with masking tape to prevent dust from entering the system.

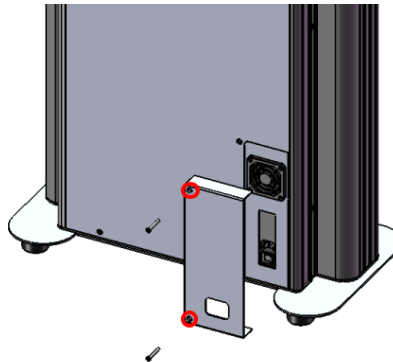
9.3 Accessing the Scan Slot

1. Remove the back cover as covered in 9.2.
2. The scan slot is exposed:

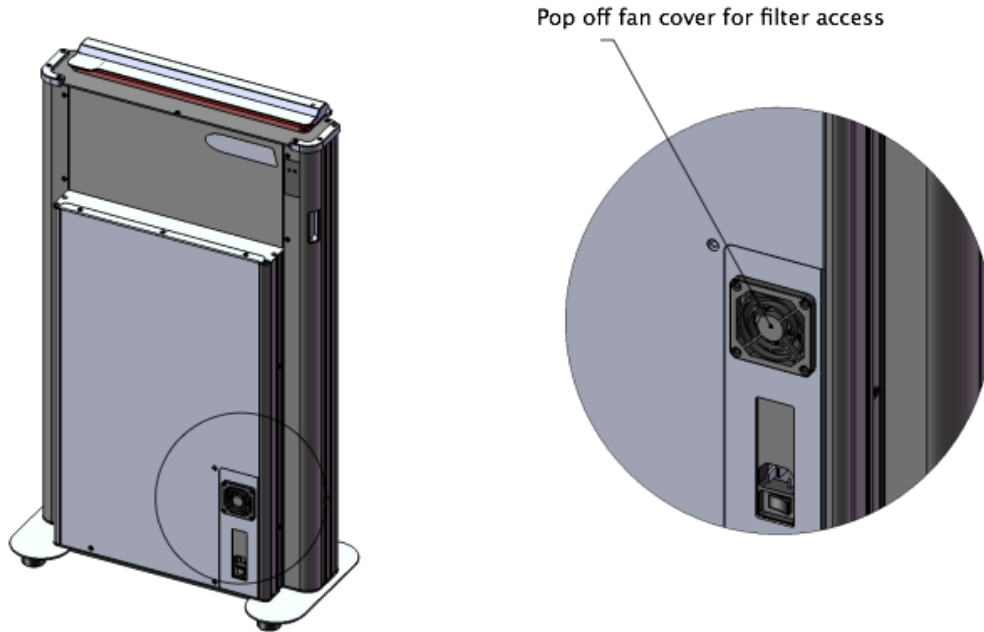


9.4 Cleaning the Filter

1. Remove 2 8-32 x $1\frac{1}{4}$ " flathead screws to remove the front power cowling.



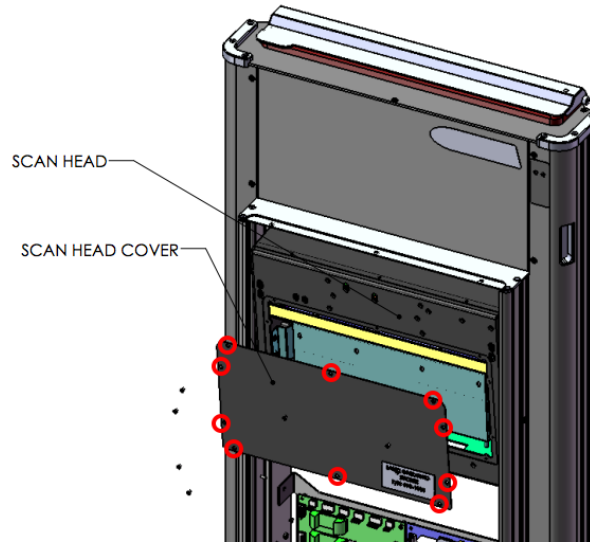
2. There is access to the front fan. The fan cover pops up with minimal force.



3. To clean the filter, rinse with water and dry thoroughly.

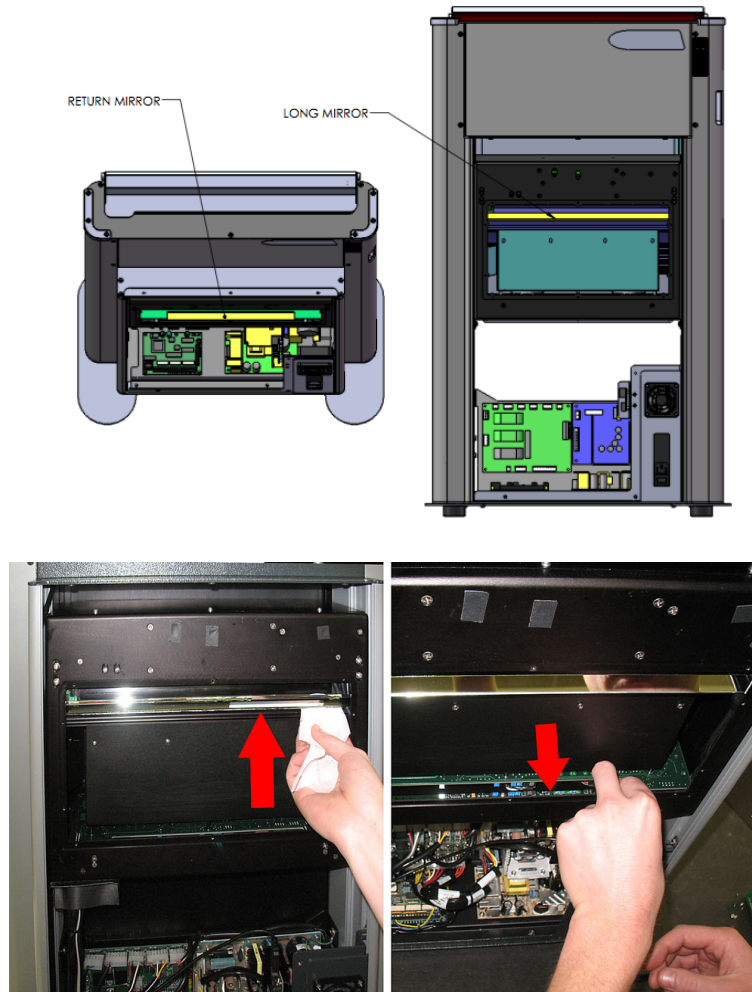
9.5 Cleaning the Mirrors

1. Remove the front cover as covered in the section on removing the front covers.
2. Remove 10 4-40 x $\frac{3}{16}$ " flat head undercut screws from the scan head cover.



3. Apply the cleaner on the soft/lint free tissue directly. Do not put cleaner directly on the mirrors. Clean the mirrors in a circular motion and do not apply a lot of force. Use a flashlight to make sure that there are no dust particles or smearing residue on mirrors.

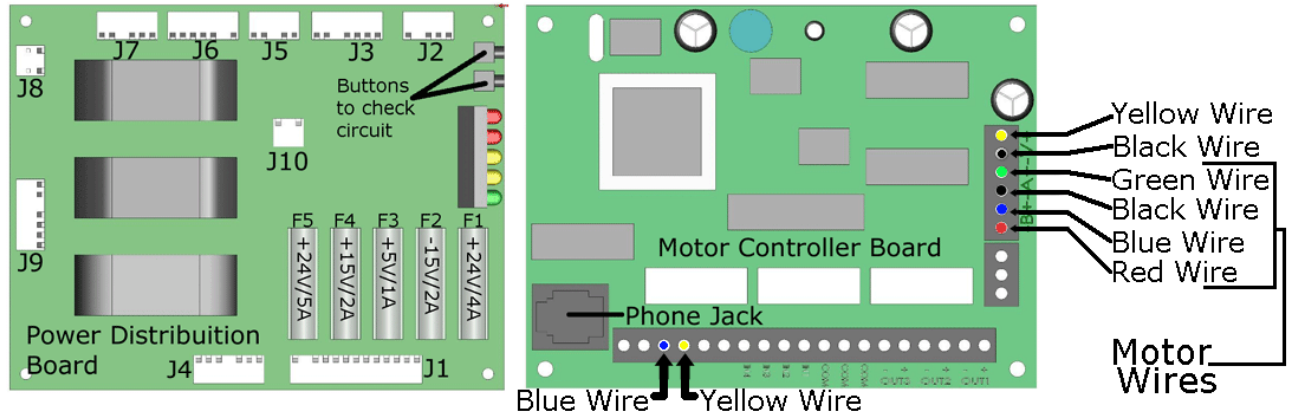
4. The location of the mirrors is shown in the graphic:



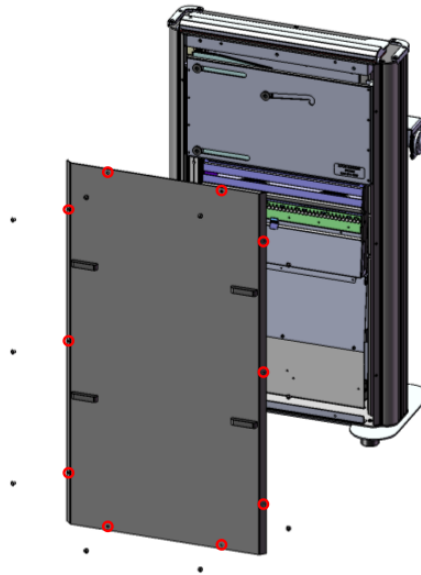
9.6 Removing the scan head

1. Remove the front cover, as covered Section 9.1.

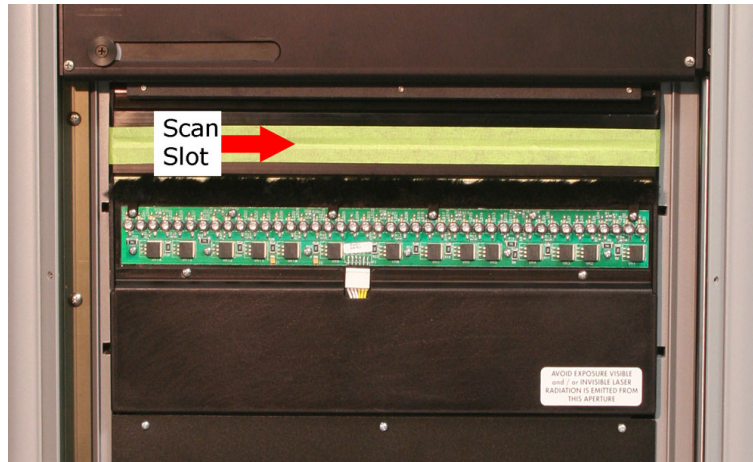
2. Unplug the cables that run out of the scan head:
Power Distribution board: J8 J9 J5 J3 J2
Phone cable (on the Motor Controller board)
USB plug



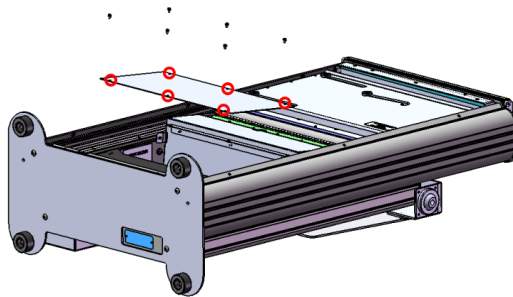
3. Remove 10 8-32 x $\frac{1}{4}$ " truss screws and tooth lock washers from the back panel. There are three on each side, two on the top, two on bottom.



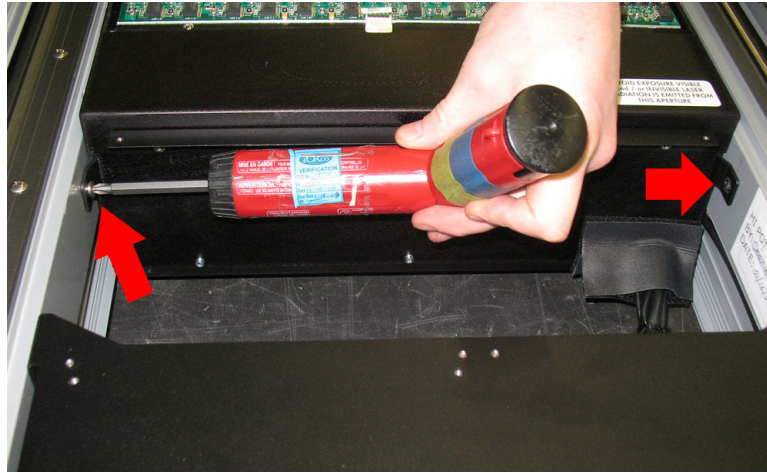
4. After removing the back cover, cover the cylinder slot with masking tape to prevent dust from entering the system.



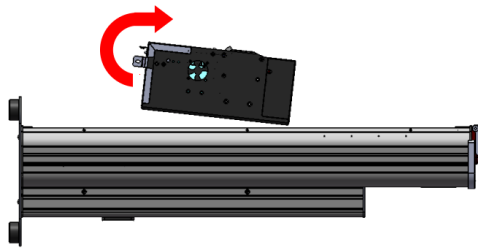
5. Remove eraser plate 6 4-40 x $\frac{1}{4}$ " pan head screws with washer and lock washer.



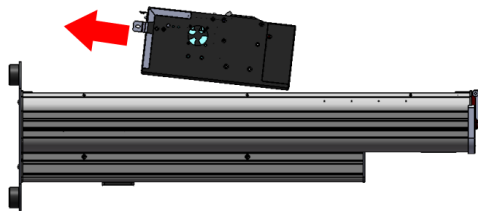
6. Remove screws holding up scan head: 2 8-32 x $\frac{1}{2}$ " truss head screw with lock washer.



7. Now the scan head is free.
8. Pivot the bottom of the scan head out of the back of the VERTX.



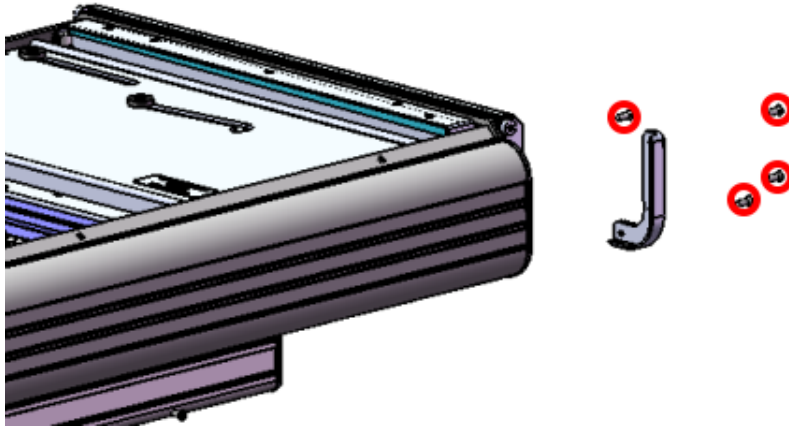
9. Slide the scan head towards the bottom of the VERTX unit, then lift out.



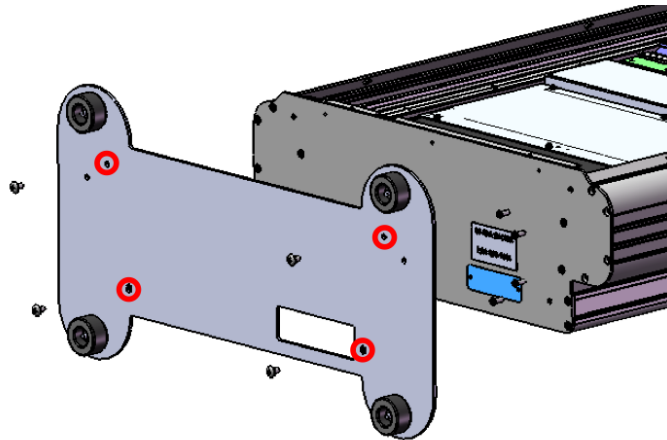
9.7 Check motor / motor drive

1. Remove the back cover, as covered in the Section 9.2.

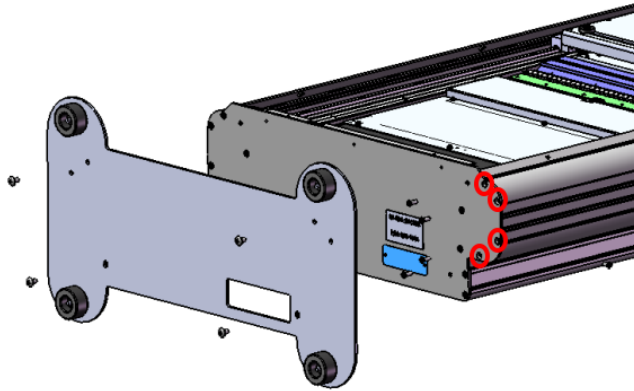
2. Remove 4 8-32 x $\frac{1}{2}$ " flat head screws from the top of the top end cap. This also removes the top bumper.



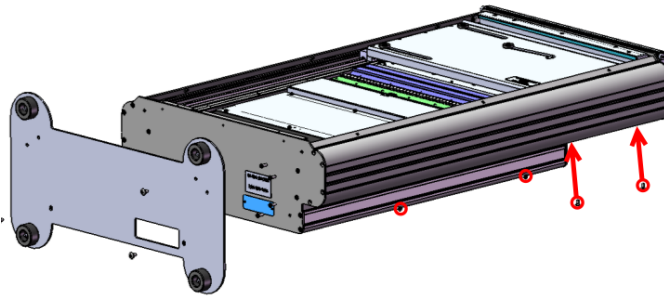
3. Remove the base plate: 4 10-32 x $\frac{3}{8}$ " truss head screws.



4. Remove 4 final screws attached to shoulder extrusion.

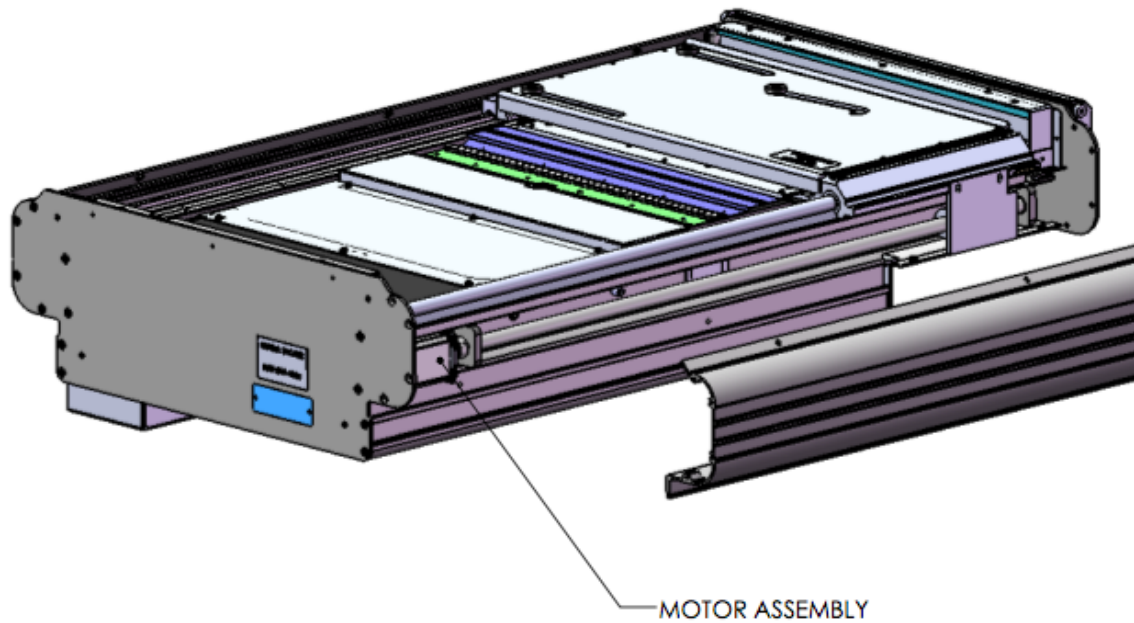


5. Remove the 4 8-32 x $\frac{3}{8}$ " flat head screws along the length of the shoulder extrusion.



6. Remove the shoulder extrusion.

7. This gives you access to motor, home position sensor, & cassette motor drive system.



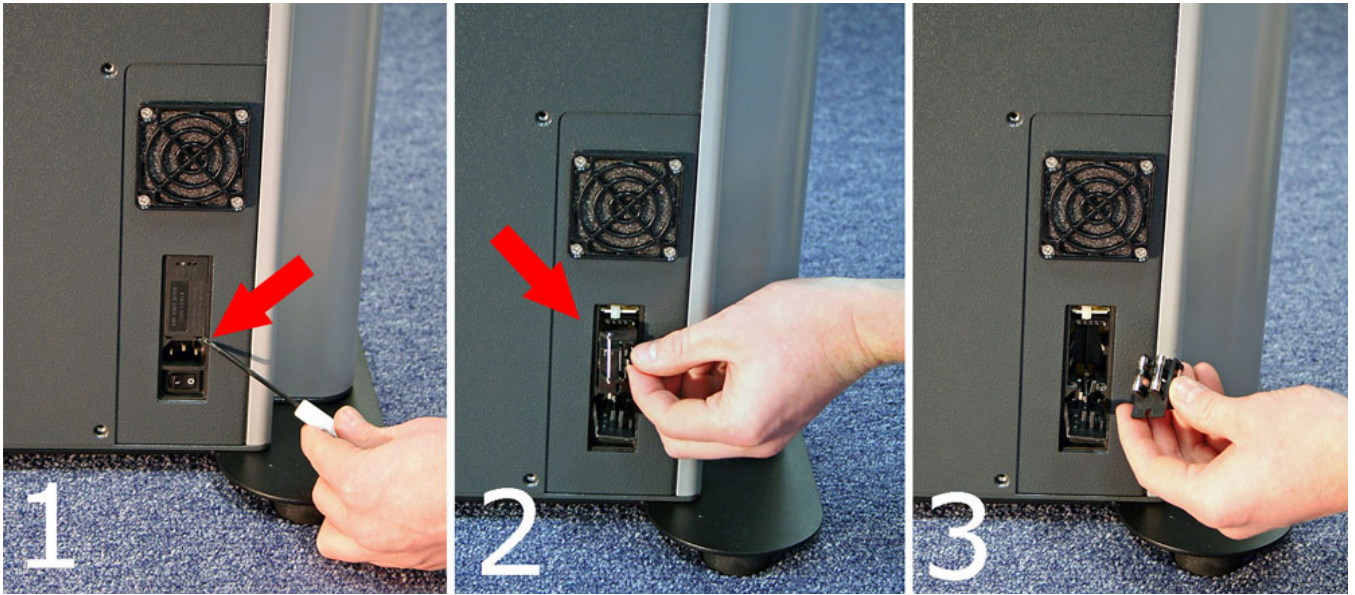
9.8 Checking the Fuses

⚠ WARNING Make sure the VERTX unit is powered off and unplugged before removing the fuses and/or cover.

9.8.1 Power Fuses

1. With a small screwdriver, gently pry off the protective flap.
2. Gently removed the fuse housing.
3. The fuses are located on the back of the fuse housing.

4. The fuses are 3A/250V.

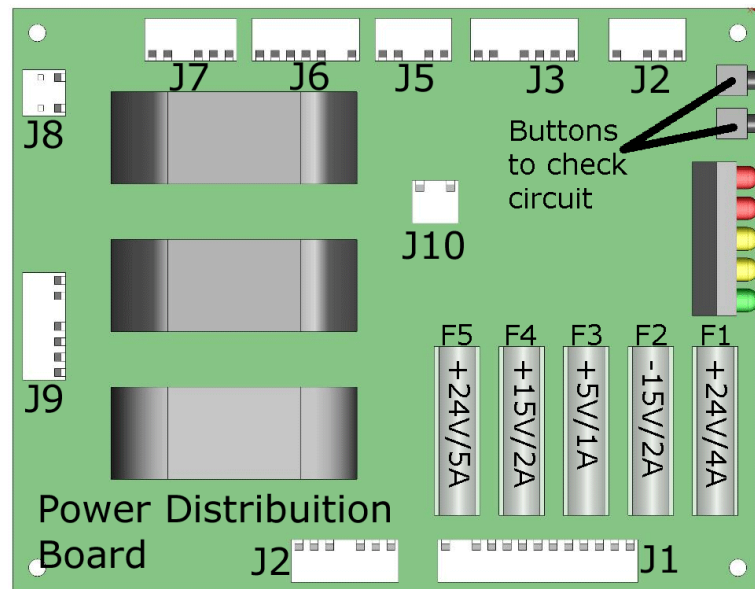
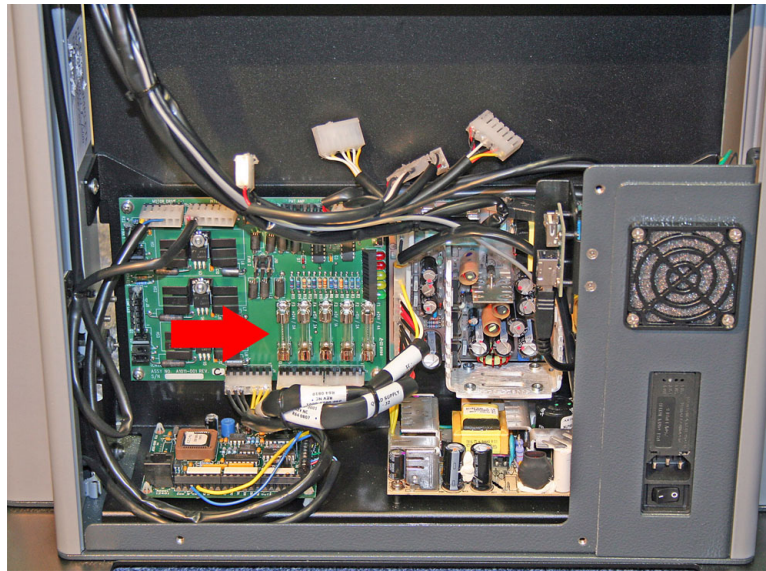


9.8.2 Power Distribution Board Fuses

⚠ WARNING Make sure the VERTX unit is powered off and unplugged before removing the cover.

1. Remove the front cover, as covered in Section 9.1.

2. There are five fuses located on the power distribution board. Remove & check them:

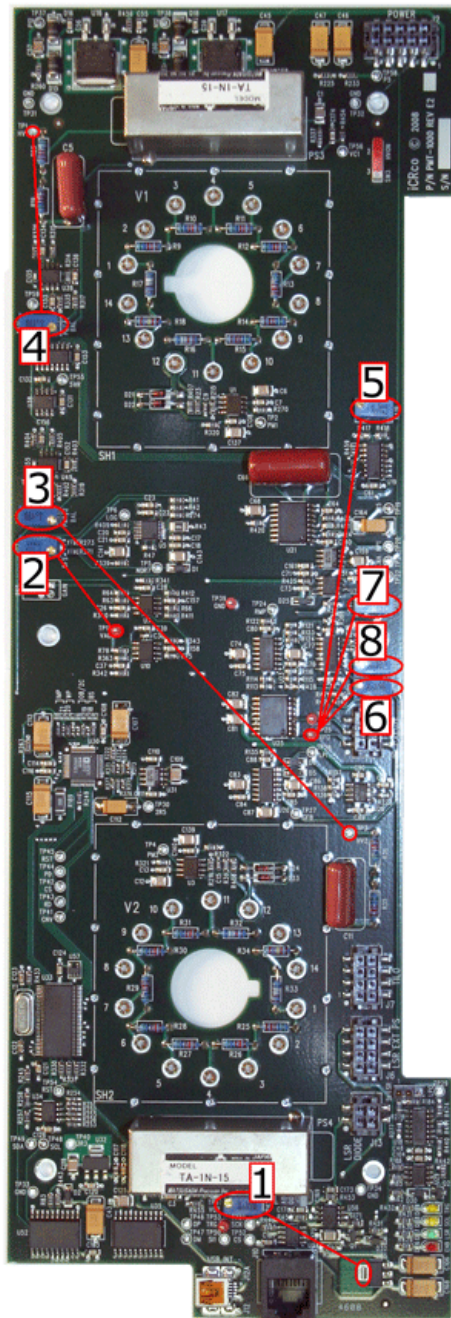


9.9 PMT LF Revision E Adjustment/Test Points

1. LASER POWER
 - (a) TRIMPOT R450 'LSP'
 - (b) TEST POINT REGULATOR TAB U55
2. ZERO OFFSET

- (a) TRIMPOT R272 'OFS'
 - (b) TEST POINT TP15 'VAD'
- 3. HIGH VOLTAGE 2
 - (a) TRIMPOT R318 'PMT#2 BAL'
 - (b) TEST POINT TP3 'HV2'
- 4. HIGH VOLTAGE 1
 - (a) TRIMPOT R316 'PMT#1 BAL'
 - (b) TEST POINT TP1 'HV1'
- 5. RAMP FREQUENCY
 - (a) TRIMPOT R419
 - (b) TEST POINT TP25 'RPO'
- 6. RAMP DC ZERO
 - (a) TRIMPOT R470 'RD0'
 - (b) TEST POINT TP25 'RPO'
- 7. RAMP OFFSET
 - (a) TRIMPOT R367 'OST'
 - (b) TEST POINT TP25 'RPO'
- 8. RAMP GAIN
 - (a) TRIMPOT R369 'RGT'
 - (b) TEST POINT TP25 'RPO'

PMT Board Test Points



9.10 Changing the Brushes

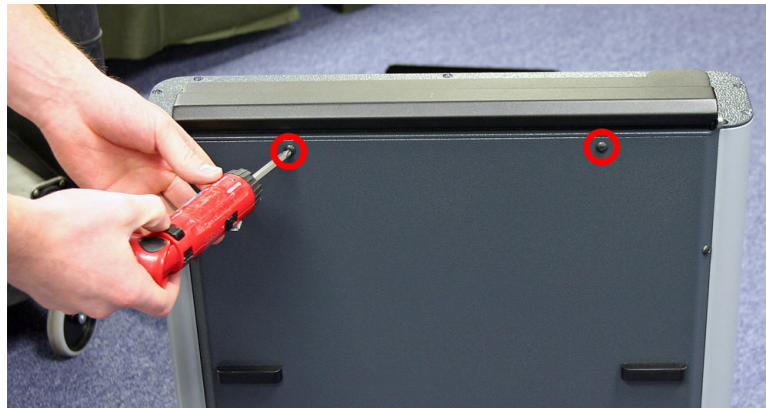
9.10.1 Scan Slot Brushes

⚠ WARNING Make sure the VERTX unit is powered off and unplugged before removing the cover.

1. Remove 9 8-32 x $\frac{1}{2}$ " screws from the top end cap assembly of the VERTX



2. Remove 2 8-32 x $\frac{1}{4}$ " truss head screws and tooth lock washers from the back panel of the VERTX



3. Remove the top end cap assembly.

4. There are 3 6-32 $\frac{1}{4}$ " flat head undercut screws holding in each brush. Remove the screws, then pull off the brush.

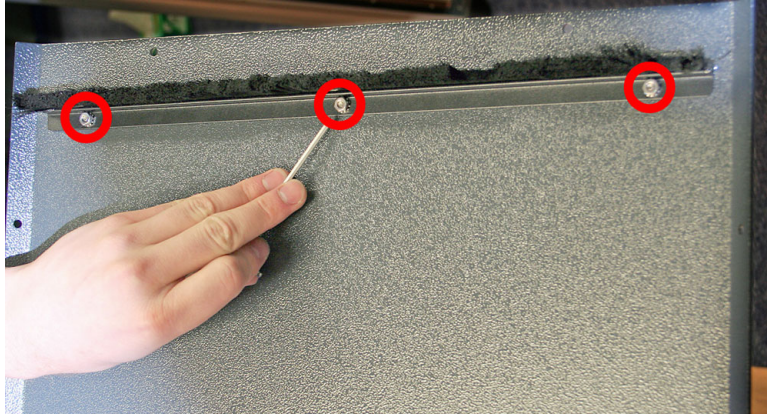


5. Remove any excess adhesive from the top end cap assembly.
6. Apply adhesive to the ends of the new brushes, then put the brushes in place on the top end cap assembly and screw the brushes back in.

9.10.2 Back Cover Brush

⚠ WARNING Make sure the VERTX unit is powered off and unplugged before removing the cover.

1. Remove the back cover, as covered in Section 9.2.
2. The brush is located near the top, attached to the back cover. Remove 3 6-32 kep nuts holding the brush in place.

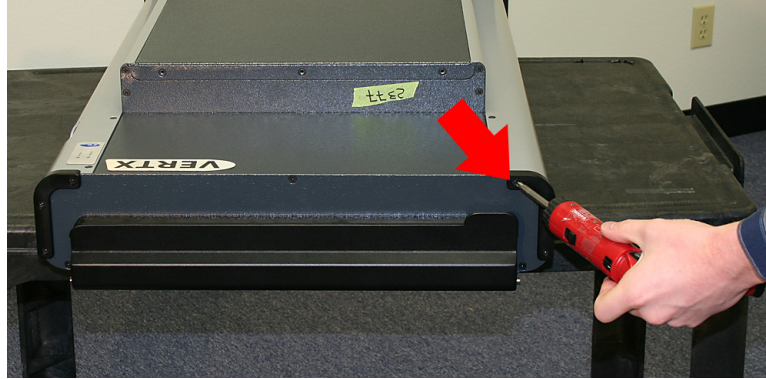


3. Remove the excess adhesive from the back cover.
4. Apply new adhesive to the ends of the new brush. Set the brush in place.
5. Screw the brush back down.

9.11 Jammed Carriage

⚠ WARNING Make sure the VERTX unit is powered off and unplugged before removing the cover.

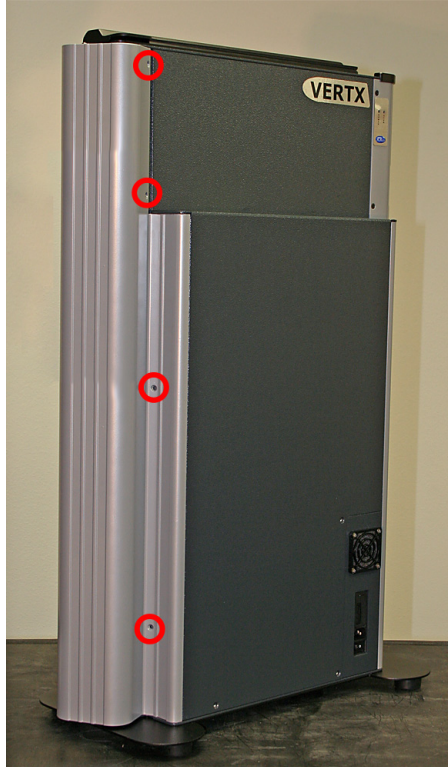
1. Remove the back cover, as covered in Section 9.2.
2. Orient the VERTX unit so that the unit is laying on its front.
3. Remove 4 8-32 x $\frac{1}{2}$ " flat head screws from the top end cap.



4. Remove 4 8-32 x $\frac{1}{2}$ " flat head screws from the base of the VERTX unit.

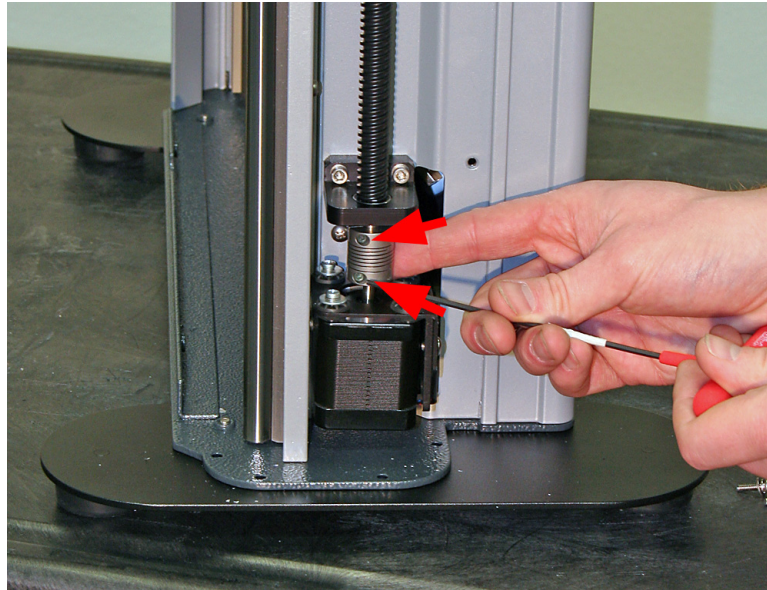


5. Remove 4 8-32 x $\frac{3}{8}$ " flat head screws from the shoulder extrusion (it is the shoulder extrusion on the opposite side of the USB plug.)



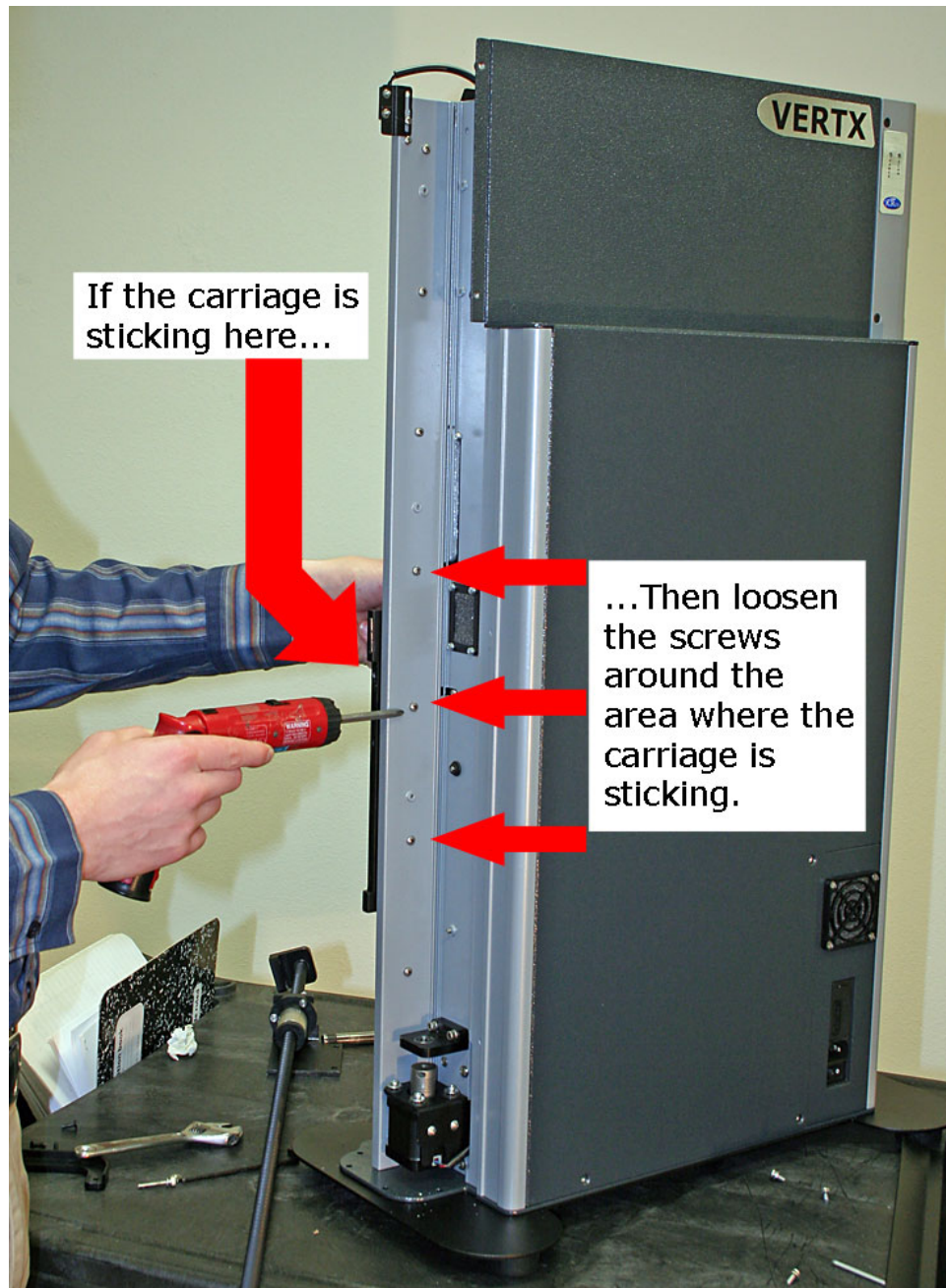
6. Remove the shoulder extrusion.
7. Visually inspect the carriage, lead screw, motor, and motor drive for physical blockage. Remove any blockage if necessary.
8. Remove the 2 screws from the lead screw angle. The carriage should slide smoothly.
9. If there is no physical blockage, or if the carriage continues to resist moving smoothly, the VERTX unit is out of alignment. Continue:

10. Loosen 2 $\frac{3}{32}$ " Allen socket head screws on the motor coupling.

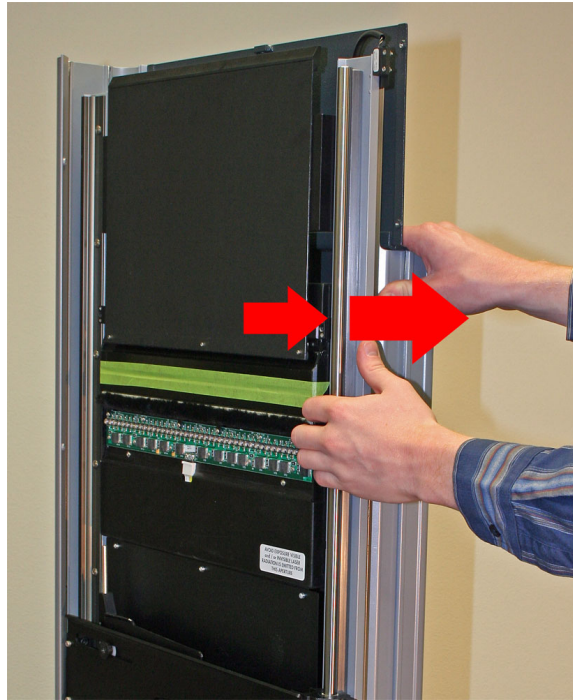


11. Gently pull the lead screw up, then out.
12. Note the point where the carriage is sticking.

13. Loosen the screws around the area where the carriage is sticking.



14. With minimal force, pull the carriage shaft towards the outside of the VERTX unit, and while still applying force, re-tighten the screws.

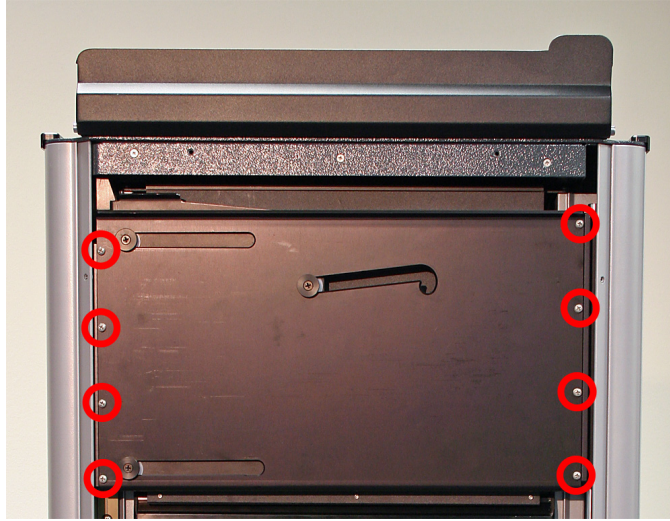


15. Check to see if the carriage moves smoothly.
16. If the carriage continues to stick, repeat the last four steps until the unit is back in alignment.

9.12 Jammed Cassette During Scan

1. Ensure that the **Stage Current (Scan)** is set to **0.5** and the **Stage Current (Return)** is set to **1.0**. To check the Stage Currents, open QPC XSCAN, bring up the Scan interface, click the **Settings** button, and enter the password *earl*. The Stage Current settings are located in the middle column, near the bottom.
2. Remove the back cover, as covered in Section 9.2

3. Remove 8 screws from the carriage. Hold the carriage with your hand before removing the last screw.



⚠ CAUTION Do **not** allow the carriage to fall to the bottom of the machine. It could cause further damage to the VERTX unit.

4. The carriage will be loose on its rails. Make sure that it does not fall to the bottom of the machine.
5. Gently lower the carriage to the bottom of the machine.
6. Pull the carriage and cassette away from the VERTX unit.
7. Gently remove the cassette door from the top of the VERTX unit.
8. Gently remove the cassette from the carriage.
9. Slide the cassette door back into the cassette.
10. Slide the carriage back into place.
11. Screw the screws into the carriage, then replace the back cover.

10. Parts List

Lead Screw with Nut	900-0232-01	1
Shaft Support Rail	900-0242-01	1
1/2" Shaft	900-0241-01	1
10mm Guide Rail	100-0867-02	1
Magnet Switch Harness	040-0013-0001	1
Fan	900-0061-01	1
Fan Filter Assembly	900-0061-03	1
USB Adapter Mount	100-0952-01	1
USB Board	500-0114-01	1
Magnet Switch Bracket	100-0682-03	1
Fan Filter Inner	100-0853-01	1
Fan Filter Inner Cover	100-0853-02	1
Lead Screw to Pillow Block Angle	100-0691-05	1
Angle Extrusion Stiffener	100-0873-01	1
1m USB Cable	900-0168-04	1
Cable Clips	900-0265-01	3
Hi-Pot Sticker	090-1008	1
Bottom End Cap Assembly	500-0183-01	1
Bottom End Cap Weldment	100-0883-01	1
Serial Number	100-0269-01	1
Pop Rivet		2
Front Angle Weldment	100-0882-01	1
Bearing Mount Assembly	500-0188-01	2
Bearing Mount	100-0695-01	1
Roller Bearing	900-0230-01	1
Motor Assembly	500-0189-01	1
Grommet Motor Bracket	100-0681-07	1
Motor Coupling	100-0855-01	1
VERTX Motor	900-0034-02	1
Motor Grommet	900-0256-01	4
Motor/Grommet Standoff	900-0262-01	4
Motor/Grommet Washer	900-0263-01	4
Electronics Plate Assembly	500-0192-01	1
Electronics Plate	100-0676-01	1
Power Distribution Board	500-0034-02	1
Quad Power Supply	900-0028	1
Eraser Power Supply	900-0029	1
Motor Controller	900-0030	1
Nylon Spacer Mounts	900-0013	4
Carriage Assembly	500-0191-01	1

Pillow Block Assembly	500-0196-01	1
Pillow Block Extrusion	100-0852-03	1
Magnet	900-0007	1
4-40 x 7/16" Flat Head Screws		2
1/2" Open Bearing	900-0240-01	2
Push Rod Assembly	500-0190-01	1
Push Rod Holder	100-0851-01	1
Push Rod	900-0231-01	1
Delrin Shoulder Washer	100-0699-02	3
Slide Plate	100-0684-01	1
Nylon Washer	900-0243-01	3
Cassette Entry Rail	100-0850-01	1
Path Plate	100-0683-02	1
Laser Warning Sticker	090-1007	1
Hat Section Bar	100-0897-01	1
10mm Profile Rail Carriage, LLY	100-0868-01	2
8-32 x 3/8" Black Flat Head Screws		3
6-32 x 1/2" Pan Head with Washer/Lock		8
USB/LED Assembly	500-0195-01	1
USB Board	500-0114-01	1
LED Harness	040-0014-0011	1
USB/LED Bracket	100-0685-01	1
USB Mount	100-0857-01	1
Bezel Assembly	500-0193-01	1
Bezel Plate	100-0688-04	1
Magnets	900-0007	13
2-56 x 3/16 Socket Cap Screw		3
Bezel Stiffener	100-0973-01	1
Bezel Blocks	100-0974-01	2
Bezel Edge Molding	100-0975-01	1
Bezel Overlay	100-0976-01	1
Machined Bezel Angle Mount	100-0977-02	2
Scan Head Assembly	500-0162-01	1
Scan Head Base	100-0749-01	1
Galvo Side Cover	100-0769-04	1
Return Mirror Side cover	100-0774-03	1
Bottom Cover	100-0782-03	1
PMT Cover	100-0772-01	1
Anti Jitter Bracket	100-0824-03	1
End Cap, Cylinder	100-0770-01	2
Machined Scan Head Cylinder, PMT Side	100-0744-01	1
Machined Scan Head Cylinder, Blank Side	100-0745-01	1
Machined Heat Sink Extrusion	100-0805-01	1

Molded PMT Block	100-0775-03	2
Cambridge Galvo & Controller	900-0192-01	1
PMT 1000 Board	500-0037-01	1
Anti Jitter Board	500-0051-01	1
Eraser Board	500-0052-01	1
USB Cable - USB A to USB B-Mini	900-0168-01	1
PMT Gasket	100-0330-04	2
Eraser Plate Angle	100-0886-02	1
3/8" Caterpillar Brush	900-0078-04	1
Tab, Left Side	100-0690-01	1
Tab, Right Side	100-0690-02	1
Captive Pin, .25" Diameter	900-0222-01	2
PMT Assembly	500-0018-01	2
PMT Tube	900-0009-01	1
Purple Filter	100-0150-01	1
Heat Shrink Tubing	900-0161-01	4
Long Mirror Assembly	500-0161-01	1
Long Mirror Mount	100-0768-01	2
Long Mirror Clamp	100-0812-02	2
Long Mirror	100-0802-01	1
Rubber Mounts	900-0224-01	2
Grounding Wire	040-0018-0001	2
Copper Tape	900-0101	6"
H-Bracket Assembly	500-0160-01	1
Galvo Mount	100-0743-01	1
Galvo Clamp	100-0746-01	1
H-Bracket Laser Side Plate	100-0777-01	1
H-Bracket Side Plate	100-0778-01	1
Adjustable Mirror Base	100-0807-01	1
Fine Adjustment Screw, 1/4-80	900-0042-02	1
Small Stationary Mirror Assembly	500-0159-01	1
Stationary Mirror Mount	100-0783-01	1
3mm Small Mirror	100-0804-02	1
Mirror Clamp, H-Bracket	100-0779-01	2
Rubber Mounts	900-0224-01	4
Turning Mirror Assembly	500-0158-01	1
Adjustable Mirror Mount	100-0785-01	1
Adjustable Mirror, Middle Mount	100-0885-01	1
Side Spring, Adjustable Mirror	100-0210-01	2
Top Spring, Adjustable Mirror	100-0211-01	1
3mm Small Mirror	100-0804-02	1
Mirror Clamp, H-Bracket	100-0779-01	2
Rubber Mounts	900-0224-01	4

Fine Adjustment Screw, 1/4-80	900-0042-02	1
Return Mirror Assembly	500-0163-01	1
Return Mirror Mount	100-0747-01	2
Return Mirror Clamp	100-0812-03	2
Return Mirror	100-0802-02	1
Rubber Mounts	900-0224-01	2
Grounding Wire	040-0018-0001	2
Copper Tape	900-0101	3"
VERTX Laser Assembly	500-0086-04	1
Beam Expander Mount, VERTX	100-0390-02	1
Locking Nut	100-0392-01	1
Laser Diode Mount	100-0393-01	1
Laser Diode Nut	100-0394-01	1
Laser Diode Cap	100-0395-01	1
Focusing Lens Locking Ring	100-0668-02	1
Focusing Lens Assembly	500-0087-03	1
Laser Diode, 658nm 50mW	900-0186	1
Laser Diode Socket	900-0187	1
Heat Sink Compound		As Needed